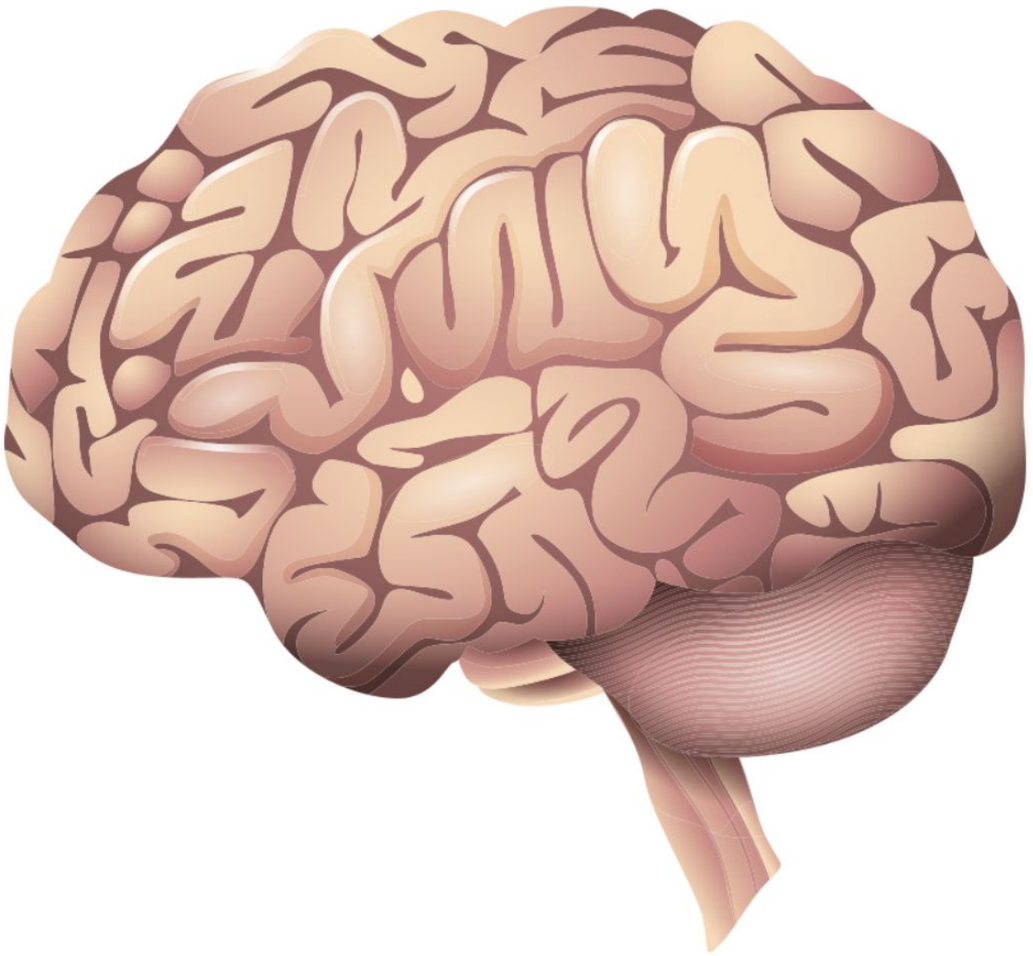
PLABABLE

GEMS

VERSION 6.2

NEUROLOGY



Normal Pressure Hydrocephalus

Dilation of the ventricles with normal CSF pressure

Classic triad

Wet

Urinary incontinence

Wobbly

Gait instability

Wacky

Neurocognitive changes - dementia

Investigations

- **CT or MRI brain** - dilation of the ventricles
- **Lumbar puncture** - CSF pressure either normal or mildly elevated

Management

- CSF shunt (definitive)
- Acetazolamide (decreases CSF pressure)
- Serial lumbar puncture (if unfit for surgery)

Intervertebral Disc Prolapse

Symptoms

- Unilateral leg pain which radiates through buttock, thighs, to the foot and toes
- Symptoms can be acute or gradual
- Leg pain more severe than the back pain
- Associated with numbness and paraesthesia
- Pain usually relieved by lying down
- Pain worsens when walking or prolonged sitting

Investigation

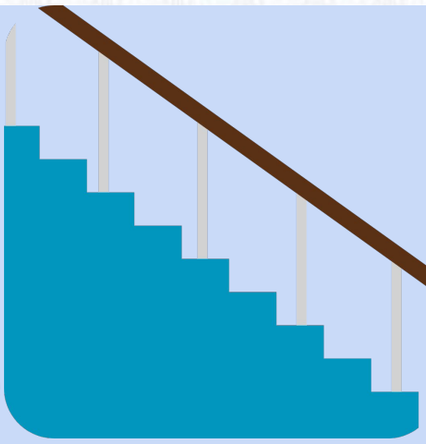
- MRI (only if red flags e.g. bowel/bladder dysfunction, saddle anesthesia)

Management

- Usually resolves spontaneously in 6 weeks but can last for months
- NSAIDS
- Amitriptyline

Vascular Dementia

Features



- **Stepwise cognitive decline**
  - Difficulty in attention
  - Gait disturbance
  - Memory and mood disturbance
  - Urinary incontinence
- **Cerebrovascular disease** in the last 3 months before presentation (either signs of neurological deficit or on brain imaging)

Risk factors

- Previous H/o stroke or TIA
- Atrial fibrillation
- Hypertension
- Diabetes
- Smoking

Investigation

- **MRI** - Multiple cortical / subcortical infarcts

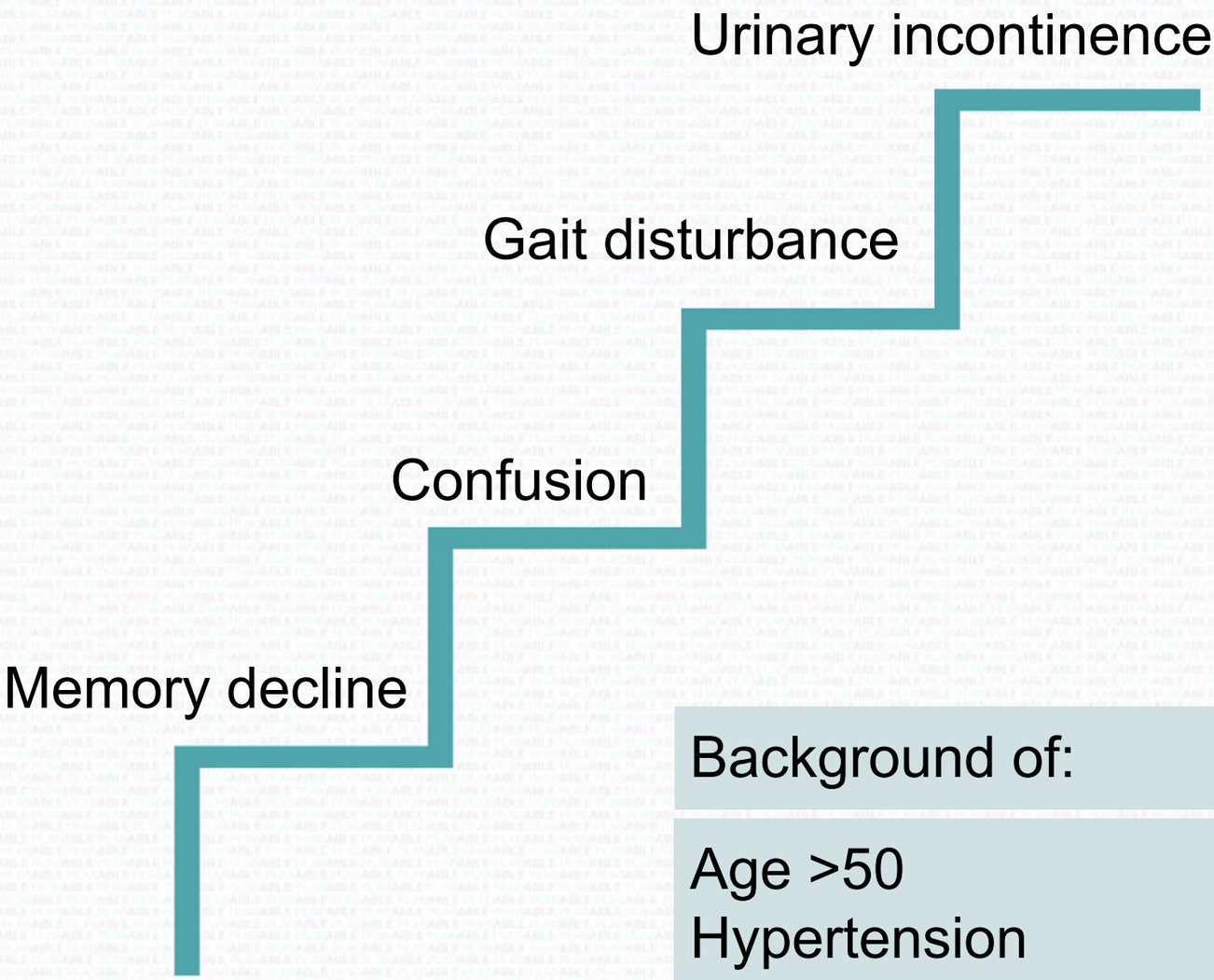
Vascular Dementia

Brain trainer:

A 66 year old man with a known case of uncontrolled **hypertension** presents to the clinic with his wife complaining of deterioration of his **memory** and **confusion**. He has a past **history** of transient ischaemic attack. Throughout the year, his wife has noticed a decline in his memory, along with **clumsy gait** which has made him prone to falls, as well as progressive **urinary incontinence**. He is a heavy smoker. His mini-mental state examination score is 19 on 30. MRI is suggestive of multiple subcortical lacunar old infarcts. What is the diagnosis?

➔ **Vascular dementia**

Vascular Dementia



Background of:

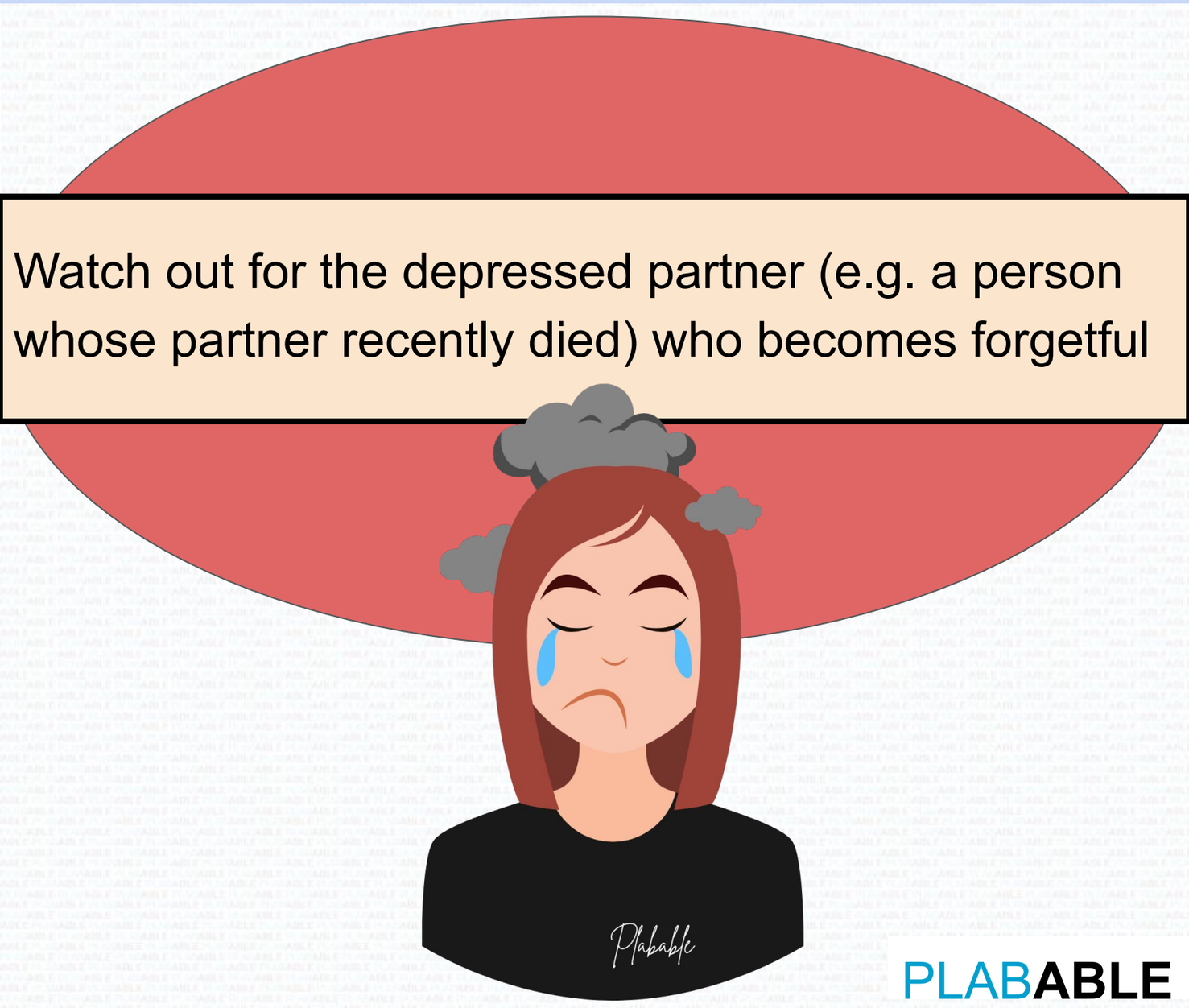
Age >50
Hypertension
Smoking
TIA
Cardiovascular risk

Pseudodementia

Cognitive impairment that mimics dementia but is due to depression

- Acute onset of symptoms
- Constant depressed mood
- A major event in life occurring before the onset of symptoms such as losing a loved one
- Insight to their symptoms

Watch out for the depressed partner (e.g. a person whose partner recently died) who becomes forgetful



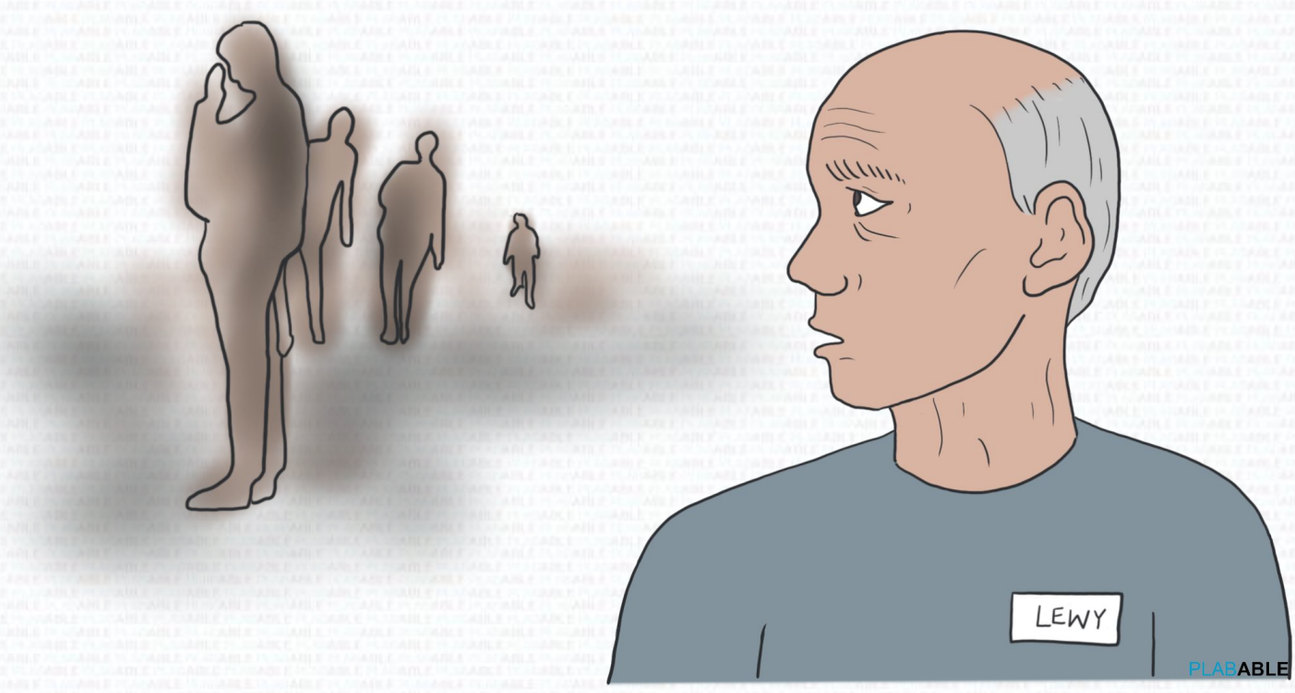
Lewy Body Dementia

Features

- Fluctuating levels of awareness and attention (dementia)
- Visual hallucination (hallmark)
- Mild parkinsonism:
  - Tremor
  - Rigidity
  - Mask like face
  - Festinating gait

Investigations

- **MRI**



Lewy Body Dementia

Lewy Body Dementia

Brain trainer:

A 67 year old man is accompanied by his wife. You notice that he walks slowly and in a **shuffling** fashion. His wife tells you that he has become increasingly **forgetful** over the last year or so and tends to lose his concentration from time to time. A few days ago, he had asked her to give the **dog** some food when, in fact, they never had a dog. She claims that he has also been talking to **imaginary friend** who he calls Vincent. After careful evaluation, a diagnosis of Lewy body dementia is made. Which is the symptoms which helped in the diagnosis?

➔ **Visual hallucinations**

Frontotemporal Dementia or Pick's Disease

Features

- Predominantly affecting the frontal and temporal lobe
- **Behavioral changes > Cognitive deficits**
- Loss of inhibition
- Inappropriate social behavior
- Loss of empathy and sympathy
- Speech difficulties

Brain trainer:

A 79-year-old man was seen in the memory clinic as an outpatient. On his mental state examination, he was noted to be **disengaged** expressing boredom on as well as making **inappropriate comments** to the doctor of a sexual nature. What is the diagnosis?

❖ **Frontotemporal dementia**

Alzheimer's Disease

Features

- Most common form of dementia
- Memory lapses
- Forgetting names and places
- Difficulty with language
- Easily getting lost
- Urinary incontinence

Risk factors

- Apolipoprotein E4 Inheritance
- Down’s syndrome
- Ageing

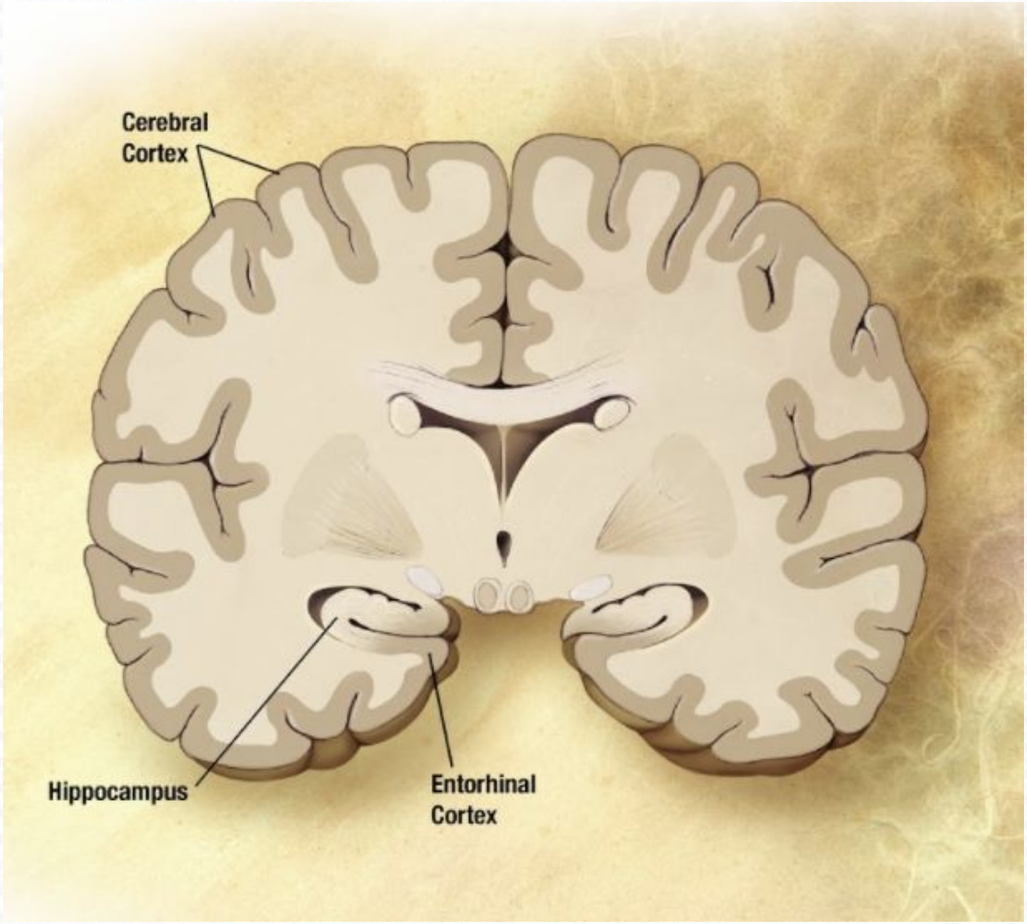
Treatment

- Acetylcholinesterase inhibitors (first line):
  - Donepezil
  - Galantamine
  - Rivastigmine

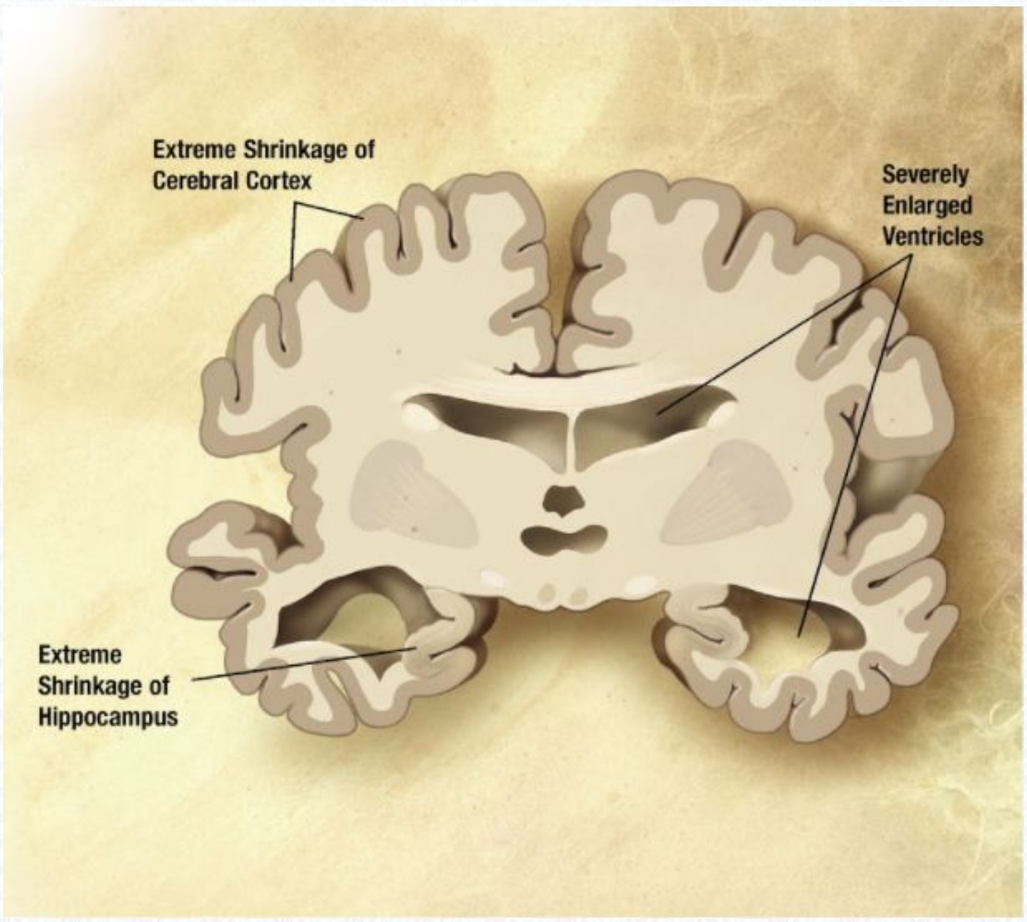
Note: Reduces heart rate therefore not suitable in heart block, bradycardia or with concomitant cardiac rate limiting meds (amiodarone, digoxin)

- Memantine - NMDA antagonist (second line)

Alzheimer's Disease



Normal



Alzheimer's

Alzheimer's Disease

Brain trainer:

A 74 year old woman was brought to the clinic by her daughter for confusion and memory impairment. The patient would periodically start a task and forget to finish them and has difficulty naming the objects. In the past few months, she has lost 5 kgs and does not sleep well at night. On examination, the patient was agitated and had decreased skin turgor, and not oriented to time or place. She repeatedly asks the same question during the interview. What is the most likely diagnosis?

➔ **Alzheimer’s disease**

Points to look for

- Memory changes before personality changes
- Not a stepwise progression
- Not related to cardiovascular event

Alzheimer's Disease

Brain trainer:

An 85 year old man attended the clinic with his daughter for becoming increasingly forgetful and finding it difficult to remember events earlier in the day. The patient often repeats himself in a conversation and finds it difficult to express himself. He also has trouble sleeping at night. CT brain revealed mild diffuse cortical atrophy. On examination, he was hypertensive and his ECG showed a prolonged PR interval. What is the most appropriate medication to prescribe?

➔ **Memantine**

Pharmacological action of the first line acetylcholinesterase inhibitors (**donepezil, galantamine and rivastigmine**) causes reduction in heart rate (bradycardia) and is therefore not suitable in patients with heart block.

Memantine (second line) acts differently by reducing excess glutamate and has negligible effect on the heart rate.

Acute Delirium

Features

- Acute onset of abnormality in thought, perception, and level of awareness
- Agitation
- Hallucinations or illusions
- Fluctuating course
- Common in the elderly

Causes

- Acute infections (UTI, Pneumonia and sepsis)
- Drugs (Benzodiazepines and Morphine)
- Urinary retention
- Fecal impaction

Management

- Treatment of underlying cause such as infections
- Supportive management
- Antipsychotics (aggressive patients)

Acute Delirium

Brain trainer:

A 70 year old male was brought to the hospital by his son who says that his father has a drastic behavior and mood changes for the past 4 days. The patient claims that there were thieves who entered the flat at night and the son says that it is not true. Also, the patient has been taking medication for BPH and is having difficulty in urinating for the last few days. What is the most likely diagnosis?

➔ Likely diagnosis: **delirium**

➔ **UTI** or acute **urinary retention** due to **BPH** as the most probable cause

Acute Delirium

Elderly

Recent onset of confusion (a few days of confusion)

Possible source of infection (e.g. recent cough, recent urinary catheter inserted)

Think DELIRIUM!

Parkinson's Disease

Presentation

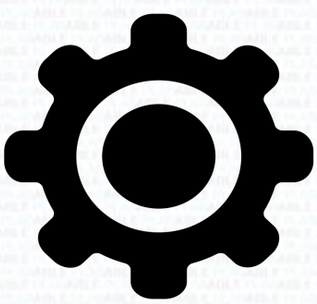
- Resting tremors
- Rigidity
- Bradykinesia
- Festinating gait
- Difficulty in balancing
- Mask-like face

Management

- **Levodopa + carbidopa** (first line)
- MAO-B Inhibitors - selegiline
- Dopamine agonist - pramipexole and ropinirole
- Amantadine

Resting tremors

Festinating gait



Cogwheel rigidity

Parkinson's Tremor Vs Essential Tremor

Parkinson's Tremor	Essential Tremor
Affects hands + gait	Affects hands + head + speech
More obvious when resting	Obvious when hands stretched out in a position against gravity *(it is a type of postural tremor)* More obvious also on action *(it is a type of action tremor)* *As it progresses, the tremors may be seen at rest later in life*
Does not improve with alcohol	Improves with alcohol
Unilateral onset (then progresses)	Bilateral onset
Persistent asymmetry affecting the side of onset most	Always symmetrical
Less common than essential tremor	10 times more prevalent than parkinson's disease
Never starts at teens or early adult life	Can start at teens or early adult life

Tremor Types

Resting Tremor

- Tremor when skeletal muscle is at rest

Examples:

- Parkinson's disease

Postural Tremor

- Tremor when skeletal muscle is holding in a position against gravity
- Ask patient to extend arms and hold in midair

- Essential tremor
- Salbutamol
- Alcohol withdrawal

Action Tremor

- Tremor when in motion
- Ask patient to touch your finger and then his nose repeatedly

- Cerebellar disease
- Multiple sclerosis

Remember, many of these tremors have an overlap. Example, a severe case of essential tremor would not ONLY have postural tremor but may also have resting and/or action tremor.

Click here for a video on tremors

Psychogenic Tremor

Features:

- Abrupt onset
- Spontaneous remission
- Tremor lessens when distracted
- Changing tremor characteristics
- Absence of neurological signs

Side effects of Medication or Worsening Parkinson's disease

Patient with parkinson's disease having new symptoms. Is it the medications causing it or the progression of the disease?

Dyskinesia ***(extra movements)*** → Likely due to medications like levodopa

Bradykinesia, rigidity ***(less movements)*** → Likely due to worsening Parkinson's disease

Multiple System Atrophy or Shy-Drager Syndrome

Features

- Parkinsonism
- Cerebellar ataxia
- Autonomic dysfunction:
  - Urinary incontinence
  - Postural hypotension
  - Erectile dysfunction

Shy-Drager syndrome is as name suggests a multi system atrophy causing group of various symptoms. It is difficult to pinpoint one particular part of CNS involvement.

Multiple System Atrophy or Shy-Drager Syndrome

Brain trainer:

A 53-year-old with a neurological condition which initially started with symptoms of **urinary incontinence**, **erectile dysfunction** and **dizziness** when standing. He is seen to have **ataxia**, **rigidity**, **slow movements** and slight **tremors** of the hands. On examination, postural hypotension is seen. Which is the condition this man is having?

➔ **Shy-Drager syndrome**

Guillain-Barre Syndrome

Features

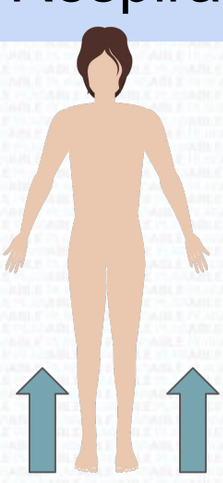
- History of URTI or gastroenteritis
- **Symmetrical** weakness **starting from the lower limbs**
- Dysphagia, dysarthria and respiratory failure in severe cases
- **Reduced reflexes**
- Paresthesia
- **Sensory loss** starting from the lower limbs
- Urinary retention

Investigations

- Lumbar puncture (for acute setting)
  - ↑ CSF protein, absent elevation of cell count
- Nerve conduction studies (gold standard)

Management

- Plasma exchange
- Intravenous Immunoglobulin
- Respiratory support



- Symmetrical
- Ascending
- Motor loss
- Sensory loss

Guillain-Barre Syndrome

Brain trainer:

A patient with an episode of gastroenteritis a few weeks ago experiences bilateral lower limb weakness that started over a few days and is seen to be ascending. What is the most appropriate test?

➔ **Nerve conduction studies**

Nerve conduction studies are the best test to perform for Guillain Barre syndrome.

Lumbar puncture is nonspecific for Guillain Barre syndrome.

Myasthenia Gravis

Autoantibodies towards acetylcholine receptors

Presentation

- Muscular fatigue on repeated usage (classically tiredness by the end of the day)
- Drooping eyelids
- Diplopia → *Ocular symptoms often first to appear*
- Dysphonia
- Dysphagia
- Associated with thymoma

Investigations

- Serum anti-acetylcholine receptor antibody (First line)
- *The other investigations are unlikely to be asked*

Management

- Pyridostigmine (first-line)
- Immunosuppression:
  - Corticosteroids
  - Azathioprine
- Thymectomy

Myasthenia Crisis

- **Presentation:** Respiratory failure

- **Management**
  - Intubation and ventilation
  - Immunoglobulins
  - Plasma exchange
  - Steroids

Guillain-Barre Syndrome Vs Myasthenia Gravis

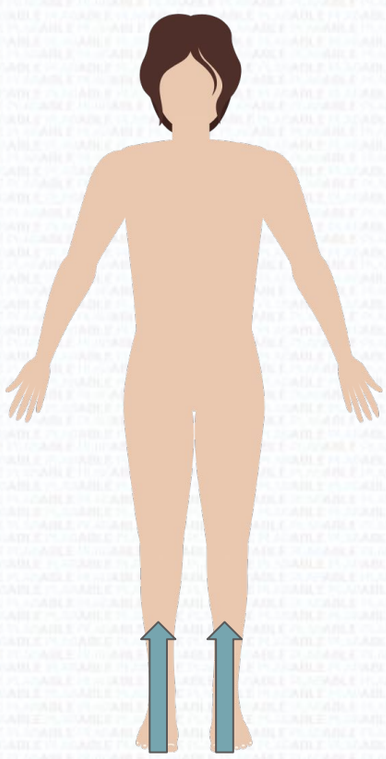
A quick memory tool to help you differentiate the two

Guillain-Barre Syndrome

Weakness that occurs approximately 3 weeks after a viral illness

Ascending pattern of progressive symmetrical weakness

Maximum severity around 2 weeks after initial onset of symptoms



Myasthenia Gravis

Muscle fatigue after activity

Hallmark of the disease

Example, if patient counts to 100 their voice becomes less audible as they approach to 100 because of muscle fatigue

Ocular symptoms often first to appear with majority of patients have ocular manifestations at some point in the course of disease

Guillain-Barre Syndrome Vs Myasthenia Gravis

We went through the best videos to pass on to you about patients who suffered with these conditions. Once you watch these videos, you would understand the differences better. Watch them on your lunch/dinner break.

Remember, patients stories and emotions stick better in your memory than words on a card

Click on the boxes to see the videos

Guillain-Barre Syndrome	Myasthenia Gravis
Video 1	Video 1
Video 2	Video 2
Video 3	Video 3

Lambert-Eaton Myasthenic Syndrome

Autoantibodies towards presynaptic calcium channels

Presentation

- Weakness (usually proximal muscles of lower limb)
- Waddling gait
- Associated with small cell cancer of the lung

Investigations

- CT / MRI scan of the chest for malignancy
- Repetitive nerve stimulation test - improves strength momentarily
- Serum voltage-gated calcium-channel antibodies

Management

- Treating the underlying neoplasm
- Diaminopyridine

Epilepsy

A diagnosis requires **at least two** or more seizures more than 24 hours apart

Classification

1. **General** → loss of awareness (e.g. clonic-tonic or absence)
2. **Focal** → awareness may or may not be impaired (possible progression to generalised)

Presentation (generalised)

- Tongue-biting
- Incontinence
- Trauma
- Full body motor contractions
- Post-ictal confusion

Presentation (focal)

- Motor - automatism, lip-smacking
- Sensory - paresthesia
- Autonomic - increased HR, BP
- Psychiatric - fear, unrealism

Epilepsy vs Non-Epileptic Attack Disorder (NEAD)

	Epilepsy	NEAD
History	Genetic factor	History of childhood physical or sexual abuse
Triggers	Sleep deprivation, alcohol, flashing lights, sudden noises	Stress, panic
Occur in company	No association	Common
Onset	Sudden	Gradual
Duration	0.5 to 2 mins	Often > 2 mins (sometimes hours)
Pelvic thrusting	Rare	Occasional
Breathing	Apnoeic	Continuous

Epilepsy vs Non-Epileptic Attack Disorder (NEAD)

	Epilepsy	NEAD
Eyes/mouth	Open	Closed
Side-to-side head movement	Rare	Common
Asynchronous movements	Rare	Common
Tongue biting	Common	Rare
Incontinence	Common	Rare
Self-injury during attack	Common	Rare
Crying during attack	Rare	Common
Post-ictal EEG	Slow	Normal
Post-ictal confusion	Common	Rare
Medications	Responsive	Not responsive

Absence Seizure

Brain trainer:

A child is briefly observed staring blankly into space and up-rolling their eyes whilst maintaining balance sitting in a chair.
What is the diagnosis?

➔ **Absence seizure**

First-Fit Clinic

Any patient with an episode of seizure where epilepsy is considered should be seen in the first-fit clinic

First-fit clinics are run by the neurology team.

Driver and Vehicle Licensing Agency (DVLA)

Brain trainer:

A lorry driver has an epileptic seizure for the first time. What procedure must be followed?

➔ **Cease driving, inform the DVLA, commence driving once certain conditions are met**

Suspension to license after seizure:

- Car driver → 1 year
- Lorry driver → 5 years

*DVLA (Driver and Vehicle Licensing Agency) is a UK government organisation responsible for maintaining the database of drivers and cars. The DVLA is responsible in producing driving licences to drivers who have passed the driving exam. They are also responsible in taking away licences if the driver is not fit to drive.

DVLA

Brain trainer:

A car driver with epilepsy continues to drive. What procedure must be followed?

➔**Find out if the car driver has had any recent seizures**

Drivers of cars or motorbikes can continue to drive provided they have been:

- Seizure-free for the last year OR
- Seizure free for more than 6 months if anti-epileptic medications were changed

Epilepsy & Pregnancy

Brain trainer:

Which antiepileptic is the least desirable in pregnancy?

➔ Sodium valproate

If planning a pregnancy, advise changing to a different antiepileptic. If already pregnant, continue with sodium valproate.

High dose folic acid (5mg) is recommended preconceptually up to the end of the first trimester for those taking antiepileptics.

Cranial Nerve Nuclei

Brain trainer:

From which part of the brain do the respective cranial nerves originate?

- ➔ **Cortex → 1,2**
- ➔ **Midbrain → 3,4**
- ➔ **Pons → 5,6,7,8**
- ➔ **Medulla → 9,10,11,12**

Horner Syndrome

Brain trainer:

A patient presenting with pinpoint pupils, reduced sweating and a drooping eyelid.
What is the diagnosis?

➔ **Horner syndrome**

Remember: Horner's MAP:

- **M**iosis
- **A**nhidrosis
- **P**tosis

Amyotrophic Lateral Sclerosis

Degenerative condition affecting the motor neurons of the spinal cord and the motor cranial nuclei

Presentation

- Both **LMN** and **UMN** signs
- Limb weakness (usually upper limb)
- Foot drop
- Slurring of speech
- Dysphagia
- Fasciculations

Treatment

- Riluzole
- Non-invasive positive pressure ventilation
- Nutritional support

Amyotrophic Lateral Sclerosis

Brain trainer:

A 45 year old male known to have motor neuron disease with progressive difficulty in swallowing, drooling of saliva, inability to eat properly and choking of food. What is the best method for providing nutrition for this patient?

➔ **Percutaneous endoscopic gastrostomy**

Syringomyelia

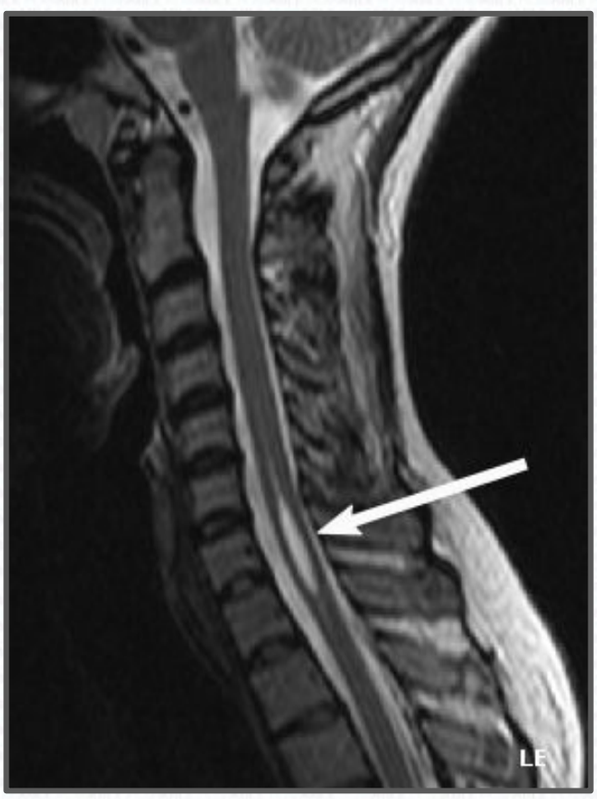
Fluid filled tubular cyst (syrinx) in the spinal cord (usually cervical column) → nervous compression

Presentation

- Loss of pain and temperature sensation (Particularly hands)
- Progressive weakness of the arms and legs
- Headaches
- Bladder disturbances

Investigation

- MRI (gold standard)



Syringobulbia

Syrinx extends into the medulla of the brain stem. The cranial nerves become affected

Mechanical Lower Back Pain

Brain trainer:

A patient presents with benign mechanical lower back pain (all other causes have been ruled out). What is the best advice?

➔ **Analgesia + maintain normal activities + avoid sitting / heavy lifting**

Bed rest is not recommended

Multiple Sclerosis

Autoimmune disorder causing demyelination of the neurons in the brain and spinal cord

Presentation

- Reduced vision or loss of vision (**optic neuritis**)
- Double vision
- Facial weakness
- Paresthesia and numbness of the extremities

Investigations

- **MRI** - **periventricular lesions** and white matter abnormalities
- Visually evoked potential studies
- **CSF:**
  - ↑ Protein
  - ↑ Immunoglobulins (o**ligoclonal bands**)

Management

Acute:

- Oral/IV methylprednisolone

Disease modifying therapy for relapses:

- Interferon beta
- Glatiramer
- Natalizumab (second-line)

Multiple sclerosis → MRI → Methylprednisolone

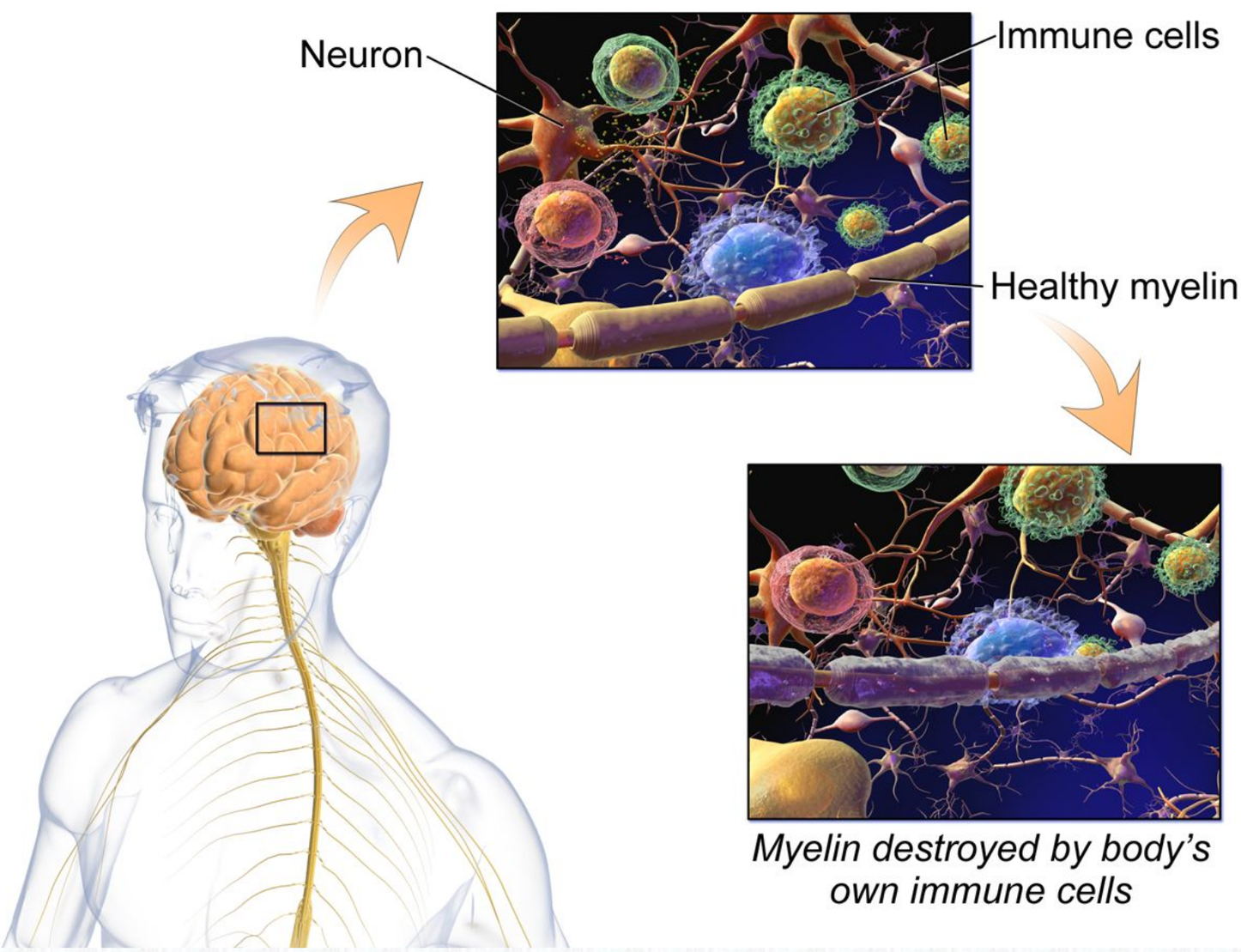
Multiple Sclerosis

Brain trainer:

A 40 year old female presented with blurred vision and intermittent clumsiness for the past 4 months. She had similar episodes 2 years back. On examination, the reflexes are brisk in her arm and the optic disk is pale.

➔ Likely diagnosis: **multiple sclerosis** (symptoms dispersed in time and location in brain + optic neuritis)
➔ Investigation of choice to confirm: **MRI brain**
➔ Acute management: **methylprednisolone**

Multiple Sclerosis



Stroke and TIA

Stroke: sudden focal neurological deficit of vascular origin due to thrombosis or bleeding and is lasting **>24 hours**

TIA: Sudden focal neurological deficit of vascular origin lasting **<24 hours**

Immediate treatment for ischaemic stroke

- If <4.5 hours from symptom onset, thrombolysis with alteplase
- Aspirin 300 mg for 2 weeks (after ruling out haemorrhagic stroke by CT scan)

Long term treatment for ischaemic stroke
(which is the same as TIA)

- Clopidogrel 75 mg lifelong *(first line)*
- Statins

If the patient has atrial fibrillation - warfarin or NOAC should be given instead of clopidogrel

Stroke and TIA

What to do immediately when you:

SUSPECT TIA *(Remember in TIA his neurological symptoms would have subsided)*

- Aspirin 300 mg
- ABCD2 is NO LONGER recommended
- Patient to be referred to be seen by specialist within 24 hours

SUSPECT STROKE

- Scan within 1 hour
- Do NOT give aspirin until haemorrhagic stroke ruled out by CT scan

Stroke and TIA

Brain trainer:

A 71 year old woman has sudden onset speech disturbance and asymmetric weakness of face and arm which started 2 hours ago. A CT scan rules out a haemorrhagic stroke. She has atrial fibrillation on her ECG. What is the long term management of this patient?

➔ **Warfarin / DOAC + statins**

Remember:

Ischaemic stroke + atrial fibrillation
= Warfarin/DOAC + statin

Ischaemic stroke + No atrial fibrillation
= Clopidogrel + statin

Stroke and TIA

Brain trainer:

A 71 year old woman has sudden onset speech disturbance and asymmetric weakness of face and arm which started 2 hours ago. A CT scan rules out a haemorrhagic stroke. She has atrial fibrillation on her ECG. Which is the SINGLE most appropriate immediate action to prevent further brain damage?

➔Alteplase

This question is not asking for long term management but rather the immediate management to prevent further damage

Alteplase is used within 4.5 hours of onset of stroke symptoms once intracranial haemorrhage has been excluded by imaging

Type Of Stroke And Imaging

Can you discriminate between an ischaemic stroke from haemorrhagic stroke based on clinical features?

↓

No! You need imaging

↓

What imaging?

↓

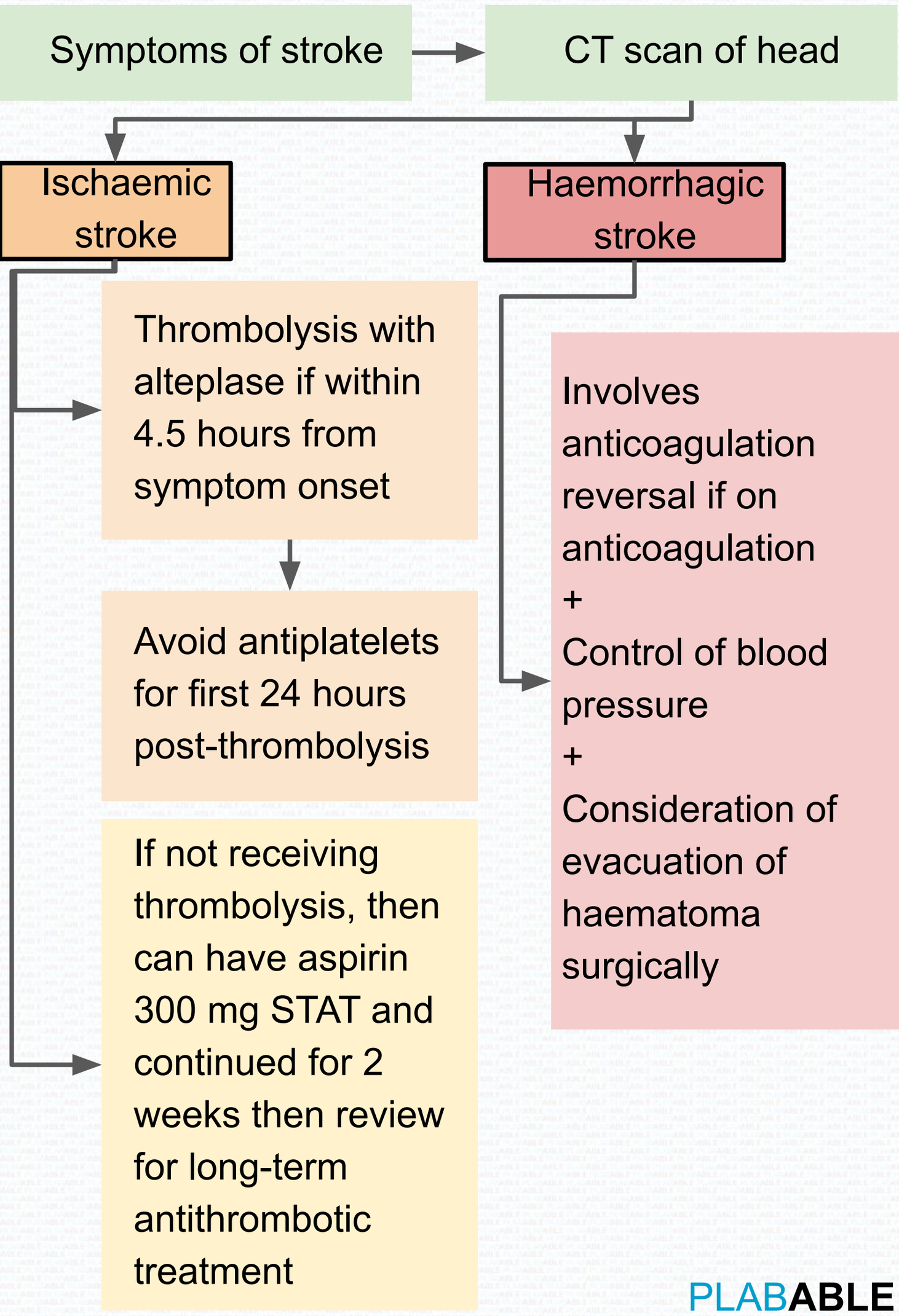
CT Brain

When to pick an MRI scan when patient presents with symptoms of stroke?

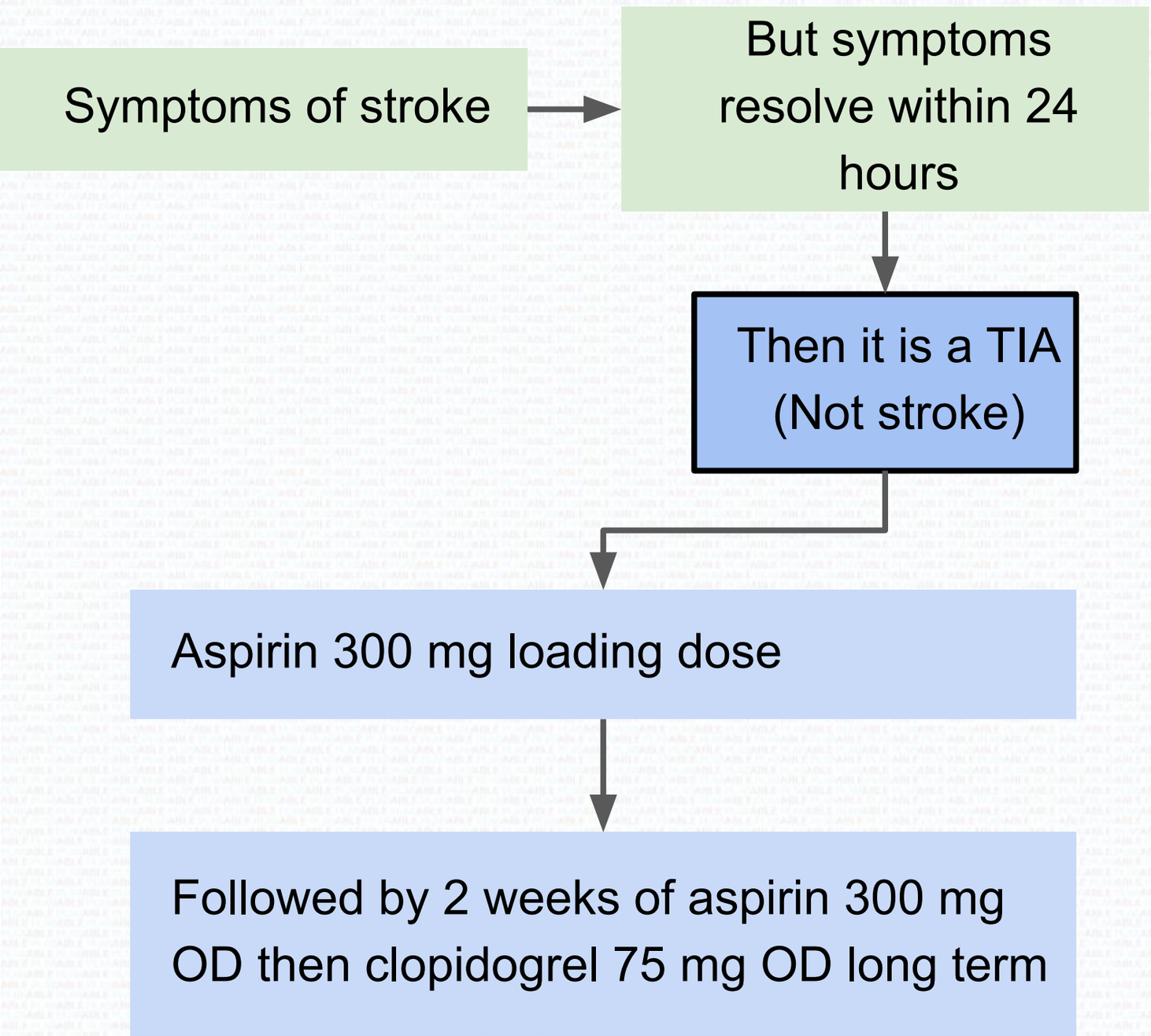
↓

- If location of stroke in brain is not clear with CT brain
- If suspecting posterior strokes
- If continue to suspect posterior circulation stroke even though CT is normal
- If suspect something else causing acute neurological symptoms rather than stroke

Acute Stroke Management



Acute TIA Management



Stroke Medical Management

The reason for what we give in stroke

Thrombolysis (e.g. with alteplase) → To dissolve clot in an ischaemic stroke (within 4.5 hours of symptom onset)

↓

Increases the likelihood of a good outcome with no or less disabling symptoms

Aspirin → To prevent a further ischaemic stroke by reducing aggregation of platelets that form clots (Given for 2 weeks)

Clopidogrel → To prevent a further ischaemic stroke by reducing aggregation of platelets that form clots (Given life long after the 2 weeks of aspirin)

Statin → To prevent a further ischaemic stroke by reducing cholesterol (Given life long)

Stroke Syndromes

Weber's syndrome (midbrain infarct)	• Branch of posterior cerebral artery occlusion • Ipsilateral oculomotor nerve palsy • Contralateral hemiparesis
Wallenberg syndrome (lateral medullary syndrome)	• PICA - Posterior inferior cerebellar artery occlusion • Ipsilateral Horner's syndrome • Contralateral loss of pain and temperature in the limbs
Medial medullary syndrome	• Anterior spinal artery occlusion • Ipsilateral tongue paresis • Contralateral hemiplegia with facial sparing
Cerebellar infarction	• Intention tremor • Ataxia • Dysarthria • Scanning speech
Posterior cerebral artery occlusion	• Occipital lobe infarction • Hemianopia with macular sparing

Bulbar and Pseudobulbar Palsy

Bulbar palsy	Pseudobulbar palsy
Lower motor neuron palsy involving cranial nerves	Upper motor neuron palsy involving corticobulbar tracts
Wasted tongue Fasciculations	Spastic tongue
Nasal speech	Spastic dysarthria

Bulbar and Pseudobulbar Palsy

Brain trainer:

A 55 year old male presents with difficulty in swallowing, bovine cough, tongue atrophy and fasciculations. He has difficulty in articulating certain words and have suffered from aspiration pneumonia in the past. What is the likely cause for his dysphagia?

➔ Most likely cause: **bulbar palsy**

Posterior Circulation Stroke

Symptoms include

- **Visual disturbances** → If occipital lobe involved
- **Vertigo, ataxia, nystagmus** → If cerebellum involved

MRI head if considering cerebellar infarct

Tremors

Essential tremors	• Absent at rest • Do not resolve with distraction
Psychogenic tremor	• Absent at rest • Resolves with distraction
Cerebellar tremor	• Intentional tremor - when voluntarily trying to pick something • Nystagmus • Ataxia • Dysarthria
Parkinson's tremor	• Resting tremor • Bradikinesia • Rigidity • Mask like face

Meningitis

	Bacterial	Viral	Tuberculous
Glucose	↓	Normal	Normal / ↓
Protein	↑	Normal / ↑	↑
WBC	Mainly Neutrophils	Mainly Lympho cyte	Neutrophils followed by Lymphocytes
Most common organism	**Neonates:** *GBS* *Listeria* *E.coli* **Adults:** *S.pneumoniae* *N.meningitidis* **Elderly:** *Listeria* *S.pneumoniae*	*Entero -virus* HSV	*M. tuberculosis*

Meningitis

Presentation

- Headache
- Fever
- Neck stiffness
- Photophobia
- Non-blanching rash

Kernig's sign: Pain and resistance on passive knee extension with hips fully flexed

Brudzinski's sign: Hips flex on bending the head forward

Treatment

- **Bacterial:**
  - <60 yrs - IV ceftriaxone
  - >60 yrs - IV ceftriaxone + ampicillin
- **Viral:** IV aciclovir
- **TB:** anti-tuberculosis medications
- Follow up with hearing test in children as hearing loss is one of the complications in children

Prophylaxis for close contacts of meningococcal meningitis is usually with ciprofloxacin or rifampicin

Cerebral Abscess

Brain trainer:

A patient presents with fever, headache and focal neurological signs. CT head scan shows ring-enhancing lesions. What is the diagnosis?

➔ **Cerebral abscess**

Cervical Spondylosis

Brain trainer:

A 50 year old female patient presents with neck pain which is worsened on movement. She also complains of numbness in the arms. On examination there is limited range of movement in the neck. What is the most likely diagnosis?

➔ **Cervical spondylosis**

Encephalitis

Brain trainer:

A patient presents with fever, reduced consciousness, motor and sensory deficits and behavioral disturbance. There is no nuchal rigidity and Kernig’s and Brudzinski's signs are negative. What is the most likely diagnosis?

➔ **Encephalitis**

Headaches

Tension-type headache

- Bilateral
- Most common type
- Mild - moderate pain without nausea
- Short duration
- **Treatment:** Reassurance and NSAIDS

Migraine

- **Unilateral**
- Throbbing pain
- Visual disturbances - **aura** and flickering of light
- Nausea
- Common in females

Treatment

Mild cases:

- NSAIDS - ibuprofen

Moderate to severe:

- Triptans
- Ergotamine

Migraine prophylaxis

- **Beta blockers** - propranolol (first-line)
- Amitriptyline
- Topiramate (second-line)

Headaches

Cluster headache

- **Unilateral** near the eye
- Severe pain **without aura**
- Associated with ipsilateral lacrimation, rhinorrhoea, nasal congestion, and conjunctival injection
- Common in males
- Occur in bouts lasting 6-12 weeks in 1-2 years

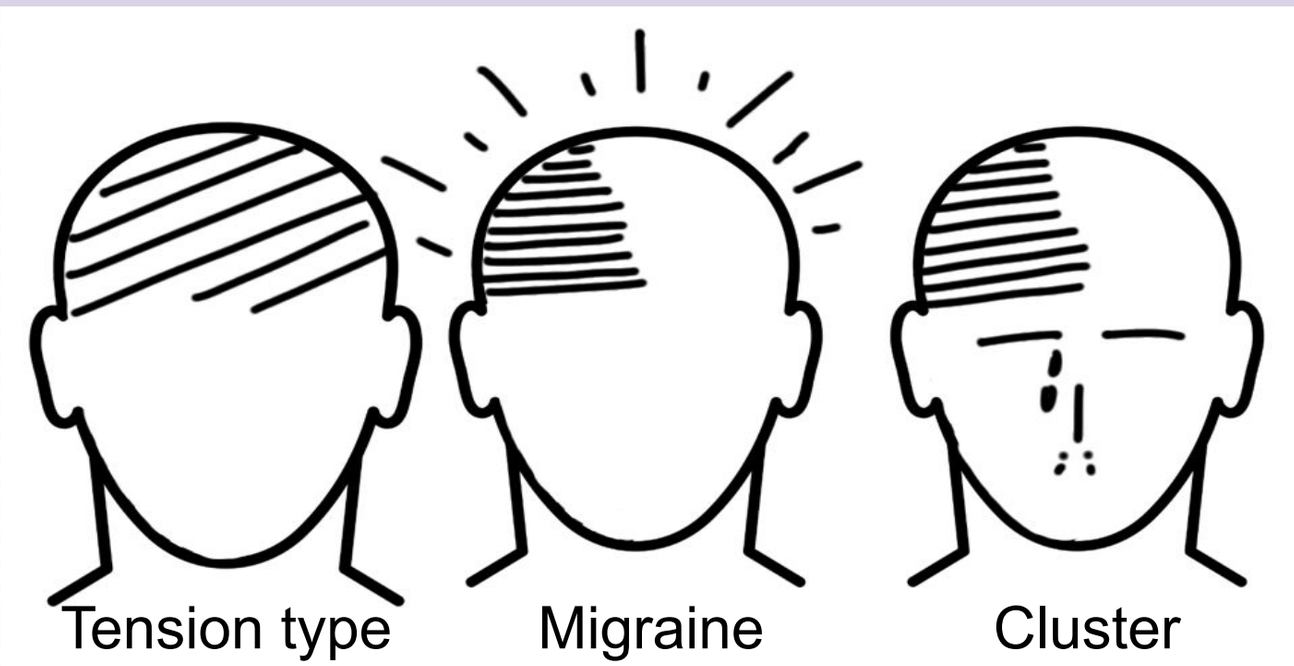
Treatment

Acute attack:

- Sumatriptan (subcutaneous injection)
- Oxygen

Prophylaxis:

- Verapamil (first-line)



Migraine

Get the definitions correct first

Aura

The term aura is used if the headache occurs after or at the same time as the sensory disturbance.

Prodromal symptoms

Symptoms that precede the headache (e.g. aura before the headache begins)

Sensory disturbances

- Visual changes → flashes of lights, zig-zags, blank spots *(visual changes are the most common aura symptom)*
- Sensation of tingling, numbness or weakness
- Vertigo
- Difficulty speaking or hearing *(less common)*

Migraine

Managements

First → Always stop COCP if patient is on COCP *(applies only to migraine with aura) Patients with migraine without aura can still use COCP*

Then → **Acute treatment required?**

Yes

Use any of the following:
Oral triptan (e.g. sumatriptan)
NSAID
Aspirin
Paracetamol

Prophylaxis treatment required?

Yes

- Propranolol *(usually used first)*
- Amitriptyline
- Topiramate *(contraindicated in pregnancy)*

PodsForDocs

Check out our podcast episode '*Headaches, Haemorrhages and Meningitis'* to further solidify your knowledge on the topic.

Click on the image below to head to our PodsForDocs podcast page to find out more.

You can also join us on our dedicated PodsForDocs WhatsApp group via the Study Group tab. Enjoy!

Migraine Vs Idiopathic Intracranial Hypertension

Migraines	Idiopathic intracranial hypertension
• Typically unilateral • Usually moderate to severe • May have aura → Auras are sensory disturbances such as visual disturbances (flickering lights, spots, partial loss of vision), numbness, speech disturbances.which occur before OR during the headache	• Bilateral • Daily headaches • Usually mild to moderate (may present for weeks or months) • Visual symptoms including loss of vision which can last a few seconds and visual blurring • Papilloedema • Worse in the morning • Better on standing • Aggravated by coughing or straining

Migraine with Aura Vs TIA or stroke

Migraines with Aura	Stroke/TIA
• Gradual onset • 98% are visual symptoms • Often presents with scotoma (enlarging black spots) and fortification spectra (zigzags) • Sensory symptoms also include numbness or tingling affecting one arm which spreads proximally from hand to mouth • Difficulty in finding the right words (word salad) • Motor weakness possible • Vertigo possible	• Sudden onset • May have temporary loss of vision • May have tingling that is unilateral • Dysarthria (slurred speech) • Dysphagia (difficulty swallowing) • May have motor disturbances such as hemiparesis • May have vertigo

Intracranial Bleeds and Vessels

MMA (Middle meningeal artery) rupture

- Causes EDH (Epidural haematoma) → Lucid intervals
- Is superficial which is the reason trauma can cause it to rupture

Bridging veins rupture

- Causes subdural haematoma

MCA (Middle cerebral artery) rupture

- Causes SAH (Subarachnoid haemorrhage)
- Arises from the Circle of Willis which is deep

Remember Berry aneurysms form in the Circle of Willis

Extradural (Epidural) Haematoma

Head trauma
+
Lucid intervals

Remember, a CT scan is always needed to determine the type of intracranial bleed but if the question ask you what type of intracranial bleed it is without giving you a CT scan, then pick extradural haematoma.

Think of the **EL**ephant sitting on your head intermittently. You would probably get LUCID intervals too.

E - Extradural/Epidural
L - Lucid

Benign Paroxysmal Positional Vertigo

Common cause of vertigo due to otoliths

Presentation

- Vertigo brought out by change in head position
- Sudden in onset
- Lasts 20-30 seconds
- Nausea
- **Dix-Hallpike** test is used to confirm

Management

- Epley's manoeuvre (reposition the otoliths)

Vestibular Neuritis and Labyrinthitis

Presentation

- Sudden onset and severe vertigo which is exasperated by a change in head position
- Not precipitated by head movements
- Hearing loss and tinnitus in Labyrinthitis
- **H/o upper respiratory tract infection (URI)**

Management

- Prochlorperazine

Sudden Falls

Drop attacks

- Sudden fall without loss of consciousness
- **Causes:** transient vertebrobasilar insufficiency, knee instability and leg weakness

Stokes Adams syndrome

- Sudden fall with loss of consciousness (few secs)
- **Cause:** Intermittent complete heart block

Vasovagal syncope

- Transient loss of consciousness due to ↓ BP
- **Causes:** emotional trigger, pain or prolonged standing

Situational syncope

- Micturition syncope
- Defecation syncope

Seizures

- Sudden fall + unconsciousness + postictal state

Hypoglycemia

- Unconsciousness or ↓ level of consciousness
- **Causes:** diabetic on insulin or insulinoma
- **Presentation:** shaking, sweating & palpitations
- **Treatment:** glucagon IM/SC or oral glucose (at home) or 10% IV glucose (in hospital)

Cauda Equina Syndrome

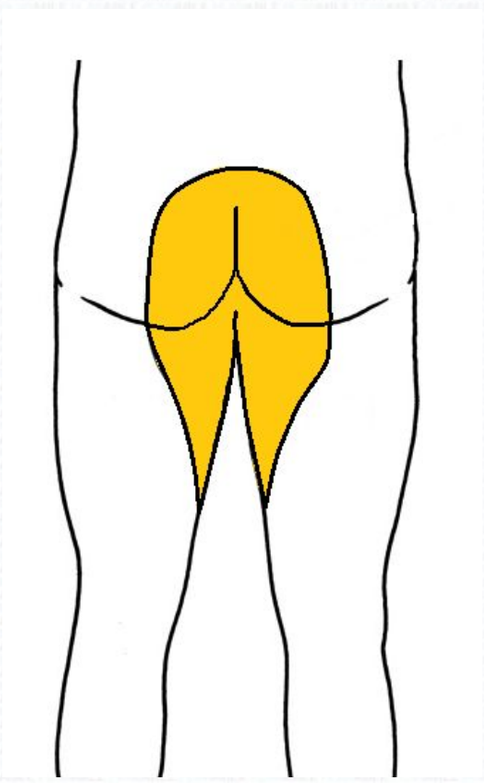
Compression of the cauda equina due to disk herniation, tumour or trauma

Presentation

- Back pain radiating to the legs
- Weakness of the legs
- Sensory disturbance of the legs
- Bowel / bladder dysfunction
- Saddle and perineal anaesthesia

Management

- Urgent surgical decompression
- Corticosteroids



Saddle anaesthesia

Aphasia

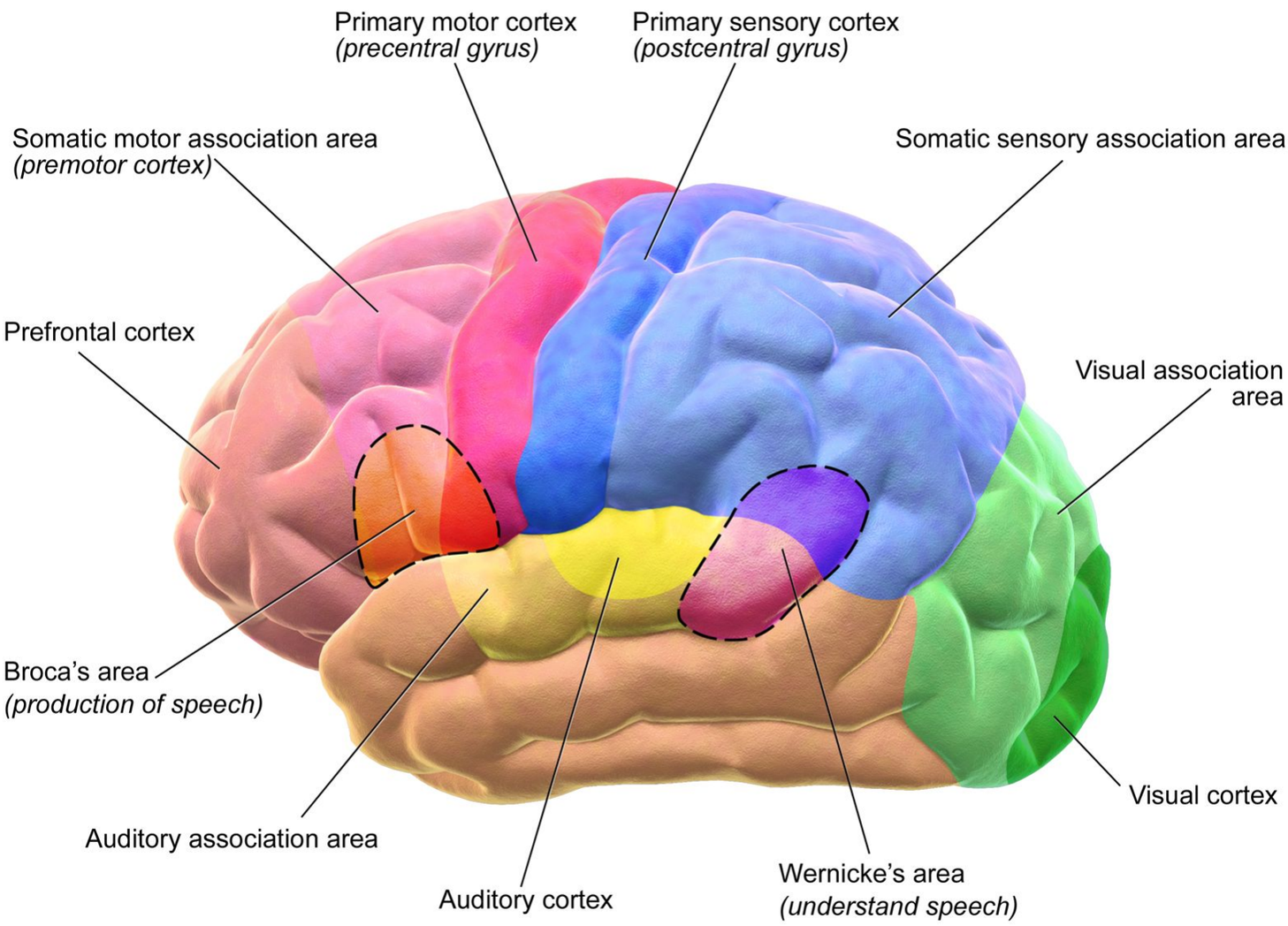
Broca's Aphasia (inferior frontal lobe of dominant hemisphere):

- Broken speech
- Patient can understand

Wernicke's Aphasia (superior temporal lobe of dominant hemisphere):

- Fluent but unmeaningful speech
- Patient does not understand

Motor and Sensory Regions of the Cerebral Cortex



Obstructive Sleep Apnoea Syndrome

Intermittent and repeated collapse of the upper airway during sleep

Features

- Daytime sleepiness and fatigue
- Common in males
- Snoring at night
- Associated with obesity and alcohol consumption

Investigation

- Polysomnography (gold standard)

Management

- Continuous positive airway pressure (gold standard)
- Weight reduction
- Cutting down alcohol consumption and smoking

Facial Palsy

Damage could be either UMN or LMN

Features in Bell's palsy (LMN palsy)

- Weakness of the muscles of facial expression
- Absence of forehead wrinkles *(wrinkles would be present in UMN lesion)*
- Difficulty in closing eye
- Deviation of angle of mouth to the normal side
- Difficulty in holding air in the mouth

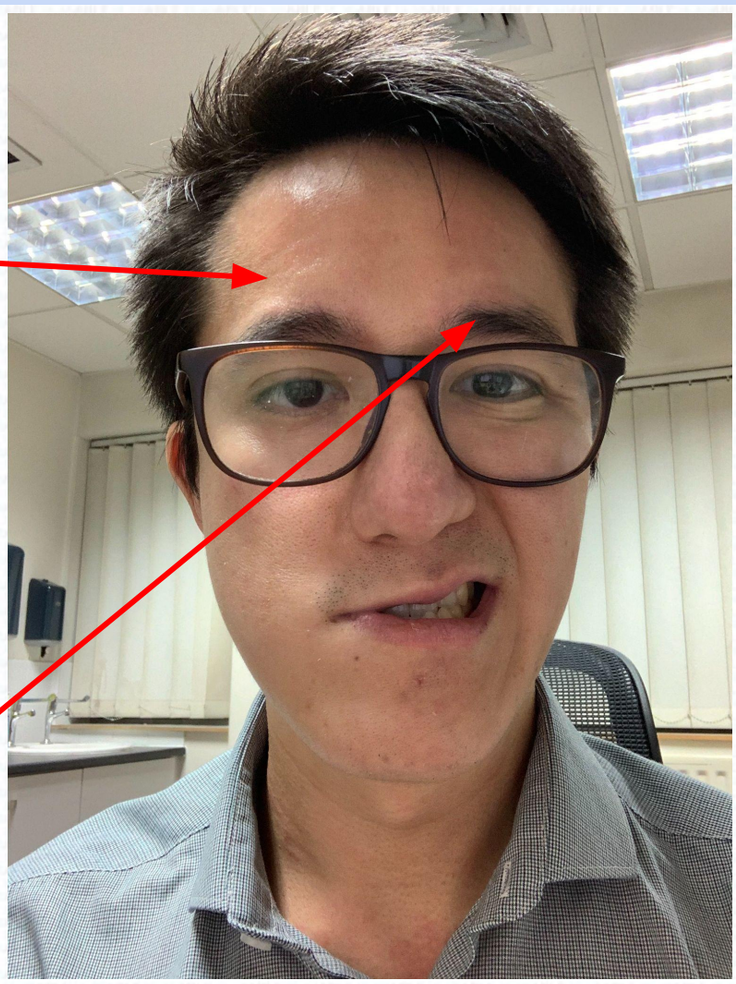
Management in Bell's palsy

- Prednisolone
- Physiotherapy

Bell's Palsy

Absent wrinkles (affected side)

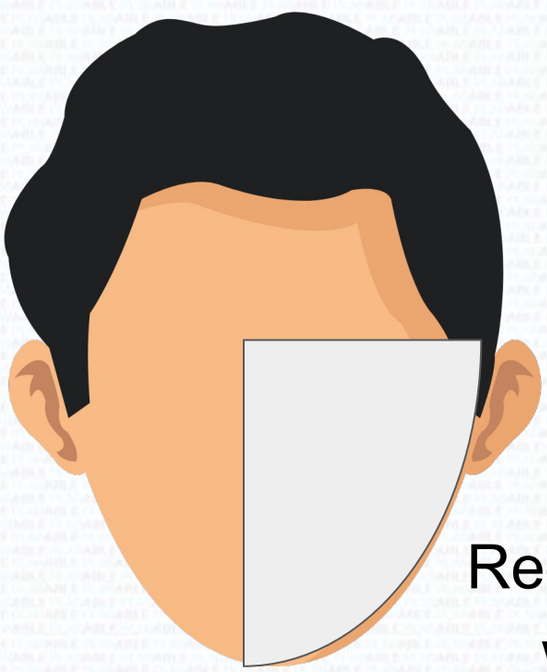
Not very obvious but pretend you are seeing a raised eyebrow with wrinkles

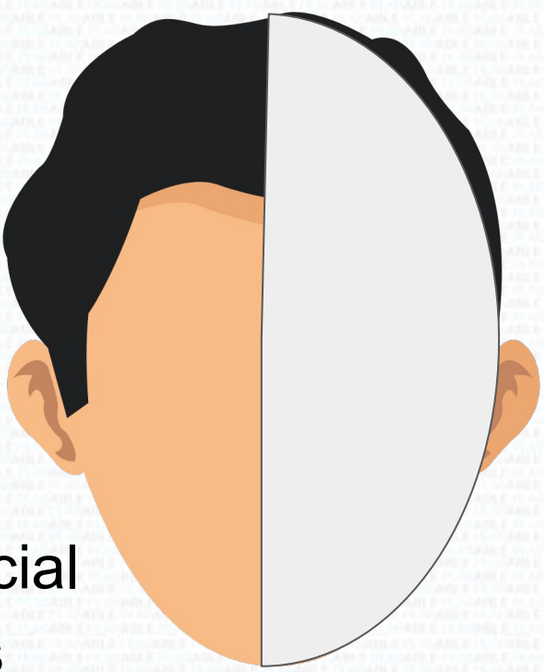


Facial Palsy

Damage could be either UMN or LMN

Upper motor neuron	Lower motor neuron
Forehead usually unaffected *(this means if trying to raise eyebrows, will see wrinkles)*	Forehead affected *(this means if trying to raise eyebrows, will NOT see wrinkles)*





Region of facial weakness

Examples:	Examples:
Stroke Multiple sclerosis	Bell's palsy Acoustic neuroma

Bell's Palsy

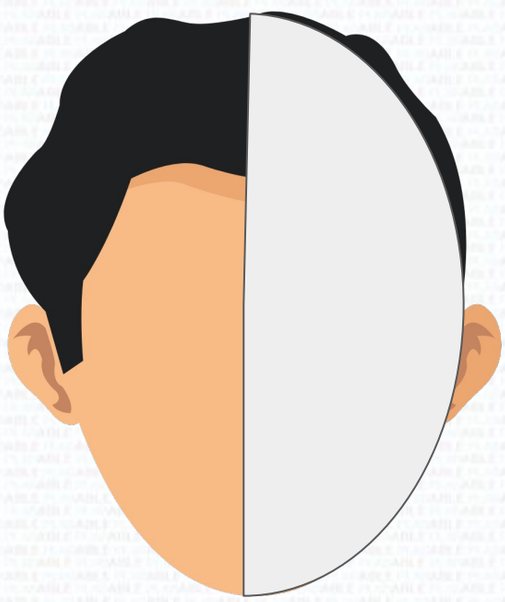
Memory tool

*While **LOWER**ing the **BELL**, he hit his **WHOLE** left face*

LOWER
→ Lower motor neuron

BELL
→ Bell's palsy

WHOLE
→ Involves the upper face too



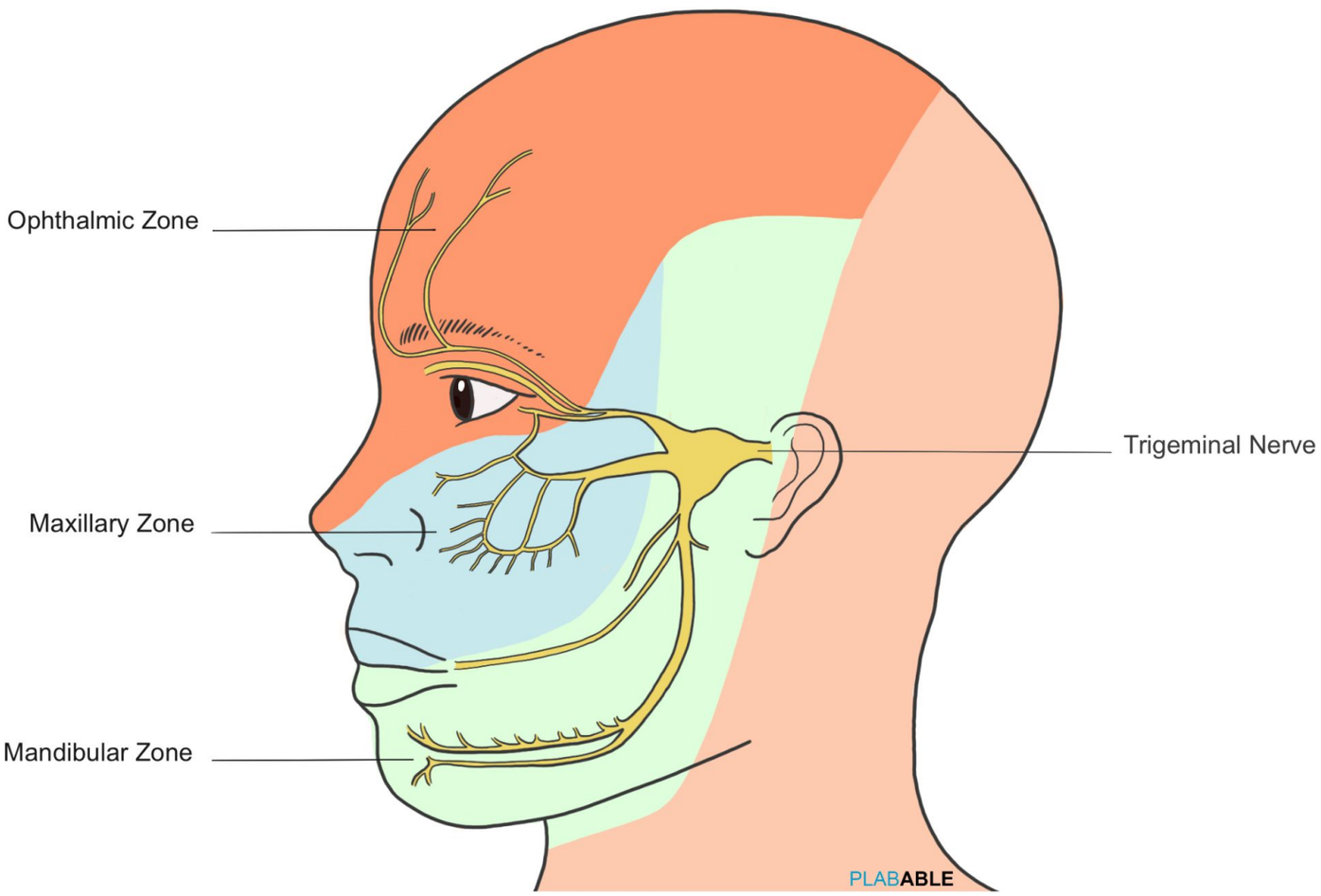
Trigeminal Neuralgia

Presentation

- Acute, unilateral sharp-stabbing pain in the distribution of the trigeminal nerve
- Pain lasts from few seconds to 2 minutes

Management

- Carbamazepine (first-line)



Trigeminal Neuralgia

Trigeminal Neuralgia

Old lady with abrupt unilateral shooting electric shock like pain in right lower jaw while chewing, talking and brushing + abrupt termination

Likely diagnosis?

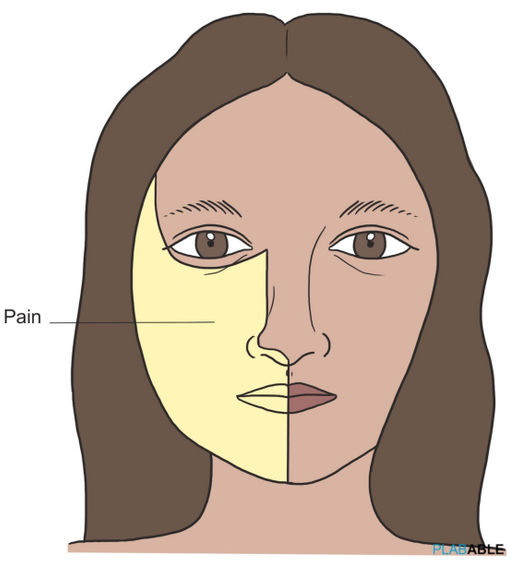
Trigeminal neuralgia

Most appropriate treatment?

1st line → **Carbamazepine**

2nd line → Gabapentin/phenytoin/lamotrigine

Electric shock like pain



Distribution of Symptoms in Trigeminal Neuralgia

Remember to give carbamazepine first!

Cavernous Sinus Thrombosis

Presentation

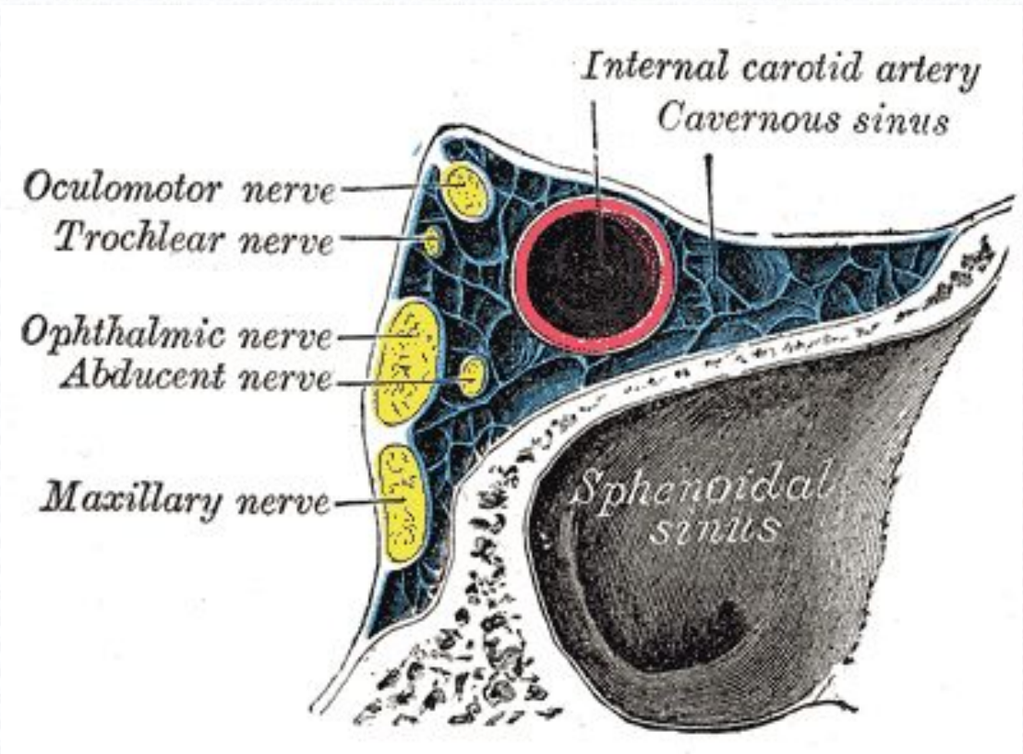
- Headache
- Unilateral periorbital oedema
- Photophobia
- Proptosis
- Paralysis of cranial nerves:
  - VI - Diplopia (Most common)
  - III - Ptosis, mydriasis & eye muscle weakness

Investigation

- CT scan

Treatment

- Broad-spectrum antibiotics
- Corticosteroids



Restless Leg Syndrome

Presentation

- An urge to move legs usually associated with creepy or crawling uncomfortable sensation in the legs
- Symptoms ↑ during inactivity and cause sleep disturbance

Investigations

- Serum ferritin
  (since RLS is associated with iron deficiency)

Treatment

- Pramipexole
- Ropinirole
- Iron supplements if serum ferritin is low

Intracranial Abscess

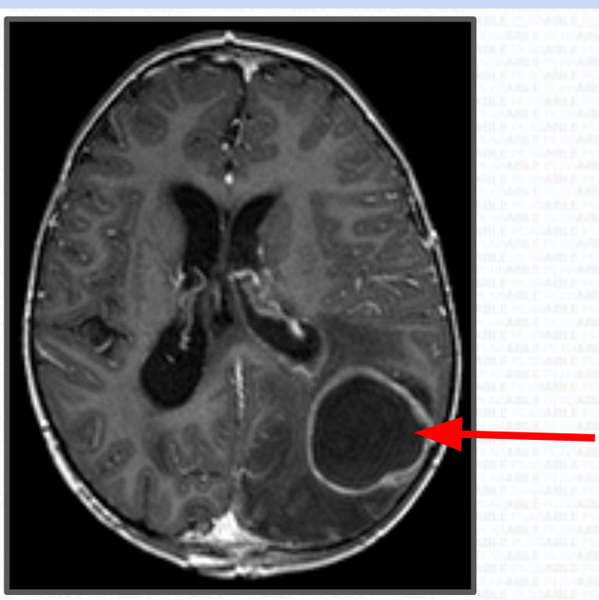
- Spread from local infections of ear, mastoid cavity, paranasal sinuses etc
- Fever
- Headache
- Confusion and drowsiness
- Focal neurological deficit
- ↑ intracranial pressure
- Most commonly caused by bacteria > fungal

Investigation

- CT scan with contrast (investigation of choice) - ring enhancing lesions
- Aspiration and culture of the abscess

Management

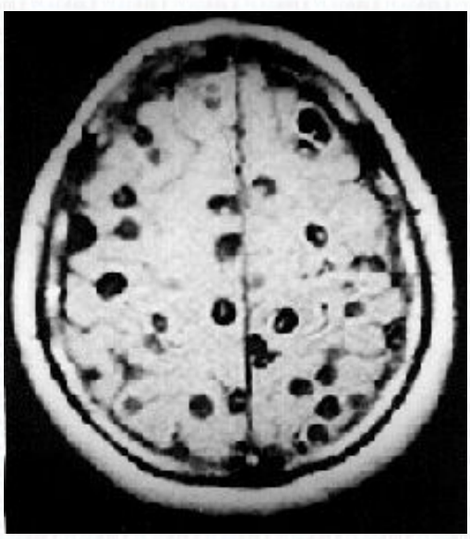
- Aspiration of the abscess
- Empirical IV antibiotics for bacterial
- IV antifungal for fungal



Other Conditions

Neurocysticercosis

- Seizures
- Caused by *Taenia solium* (Pork tapeworm)
- **CT brain:** Multiple calcified lesions
- Management:
  - Niclosamide
  - Praziquantel



Cerebral toxoplasmosis

- Encephalitis in immunocompromised host (HIV)
  - Seizures
  - Confusion
  - Focal neurological deficits
- MRI brain: multiple ring enhancing lesions
- **Treatment:** pyrimethamine/sulfadiazine and folinic acid

Antiepileptics in Pregnancy

- **Before getting pregnant** change sodium valproate to either **carbamazepine** or **lamotrigine**

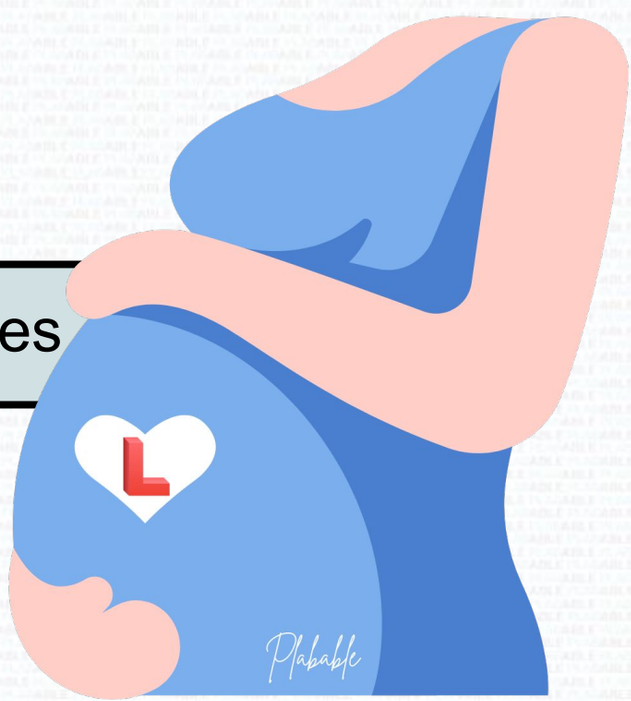
- Add **folic acid 5 mg** to any patient who is taking antiepileptic and wants to get pregnant and continue upto 12 weeks of pregnancy

- If patient is seizure free > 2 years consider stopping antiepileptics altogether

Comparing carbamazepine and lamotrigine → Lamotrigine is even safer than carbamazepine when comparing risk of major congenital malformations

Lamotrigine

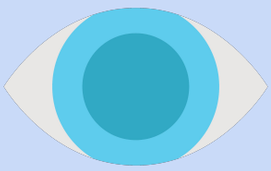
Used for ***L***adies with ***L***ittle ones



Pupillary reactions to light

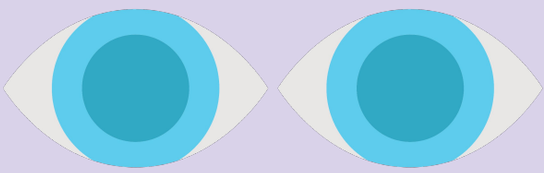
Unilateral dilated pupil

- Space occupying lesion
  - Tumour
  - Haematoma
  - Abscess



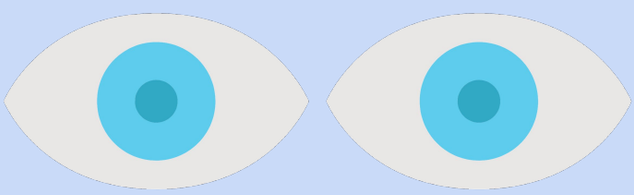
Bilateral dilated pupils

- Amitriptyline (TCA) overdose
- Cocaine overdose



Bilateral constricted pupils

- Opioid overdose
  - Morphine
  - Heroin
- CVA of the brainstem



Space Occupying Lesion

Brain trainer:

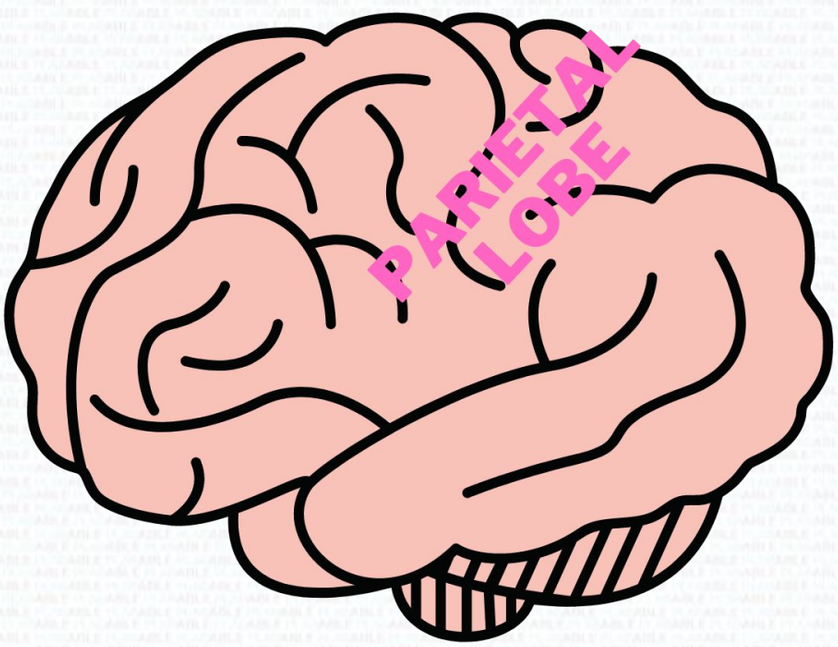
An adult with blurry vision on both eyes and a history of a headache. He has a history of hypertension. On examination, his left eye is displaced outward and downwards. What is the SINGLE most appropriate investigation?

➔ **MRI scan**

Always pick an MRI scan when suspecting a space occupying lesion of the head

Gerstmann syndrome

Rare disorder associated with damage to the inferior **parietal** lobe



Characterised by

1. Dysgraphia (inability to write)
2. Acalculia (difficulty in counting)
3. Finger agnosia (inability to distinguish the fingers on the hand)
4. Confusion of the left and right sides of the body

Transverse Myelitis

Rare spinal cord inflammation that occurs after certain infections

- Also can have ascending weakness (similar to GBS)
- Issue is in the spinal cord so an MRI may show intrinsic spinal cord lesion that enhances with gadolinium administration

Features include

- Back pain
- Weakness
- Sensory symptoms
- Urinary urgency and retention
- Flexor spasms
- Spastic quadriparesis or paraparesis

DVLA Super Summary 1

This card is for all subjects and not just neurology

Obstructive sleep apnoea (OSAS)

- If suspected
  → *Advise to stop driving*
- If diagnosed (with the exception of mild OSAS without excessive sleepiness)
  → *Patient to inform DVLA*
- If patient diagnosed and refuse to inform DVLA → *Doctor to inform DVLA*

Epilepsy

Drivers of cars or motorbikes who suffer from epileptic seizures while awake and lose consciousness can continue to drive provided they have been:

- Seizure-free for the last year OR
- Seizure free for more than 6 months if anti-epileptic medications were changed

DVLA Super Summary 2

This card is for all subjects and not just neurology

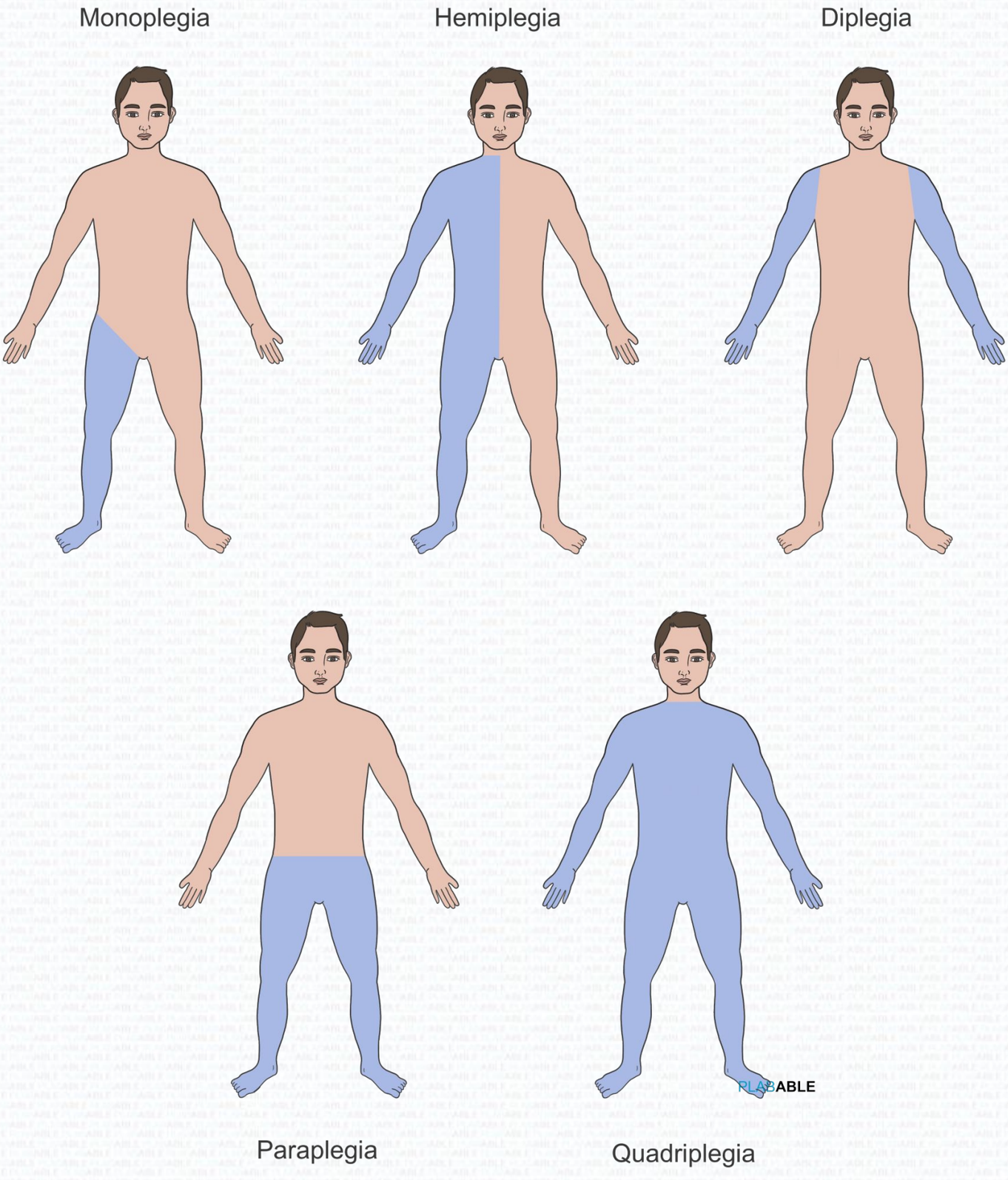
Dementia

- If diagnosed
  → *Patient to inform DVLA*
- If patient diagnosed and continues to drive despite being told not to drive by health care professionals
  → *Doctor to inform DVLA*

TIA in group 1 drivers

- Do not drive for at least one month
- No need to inform DVLA if it is a single TIA

Types of Paralysis



Types of Paralysis

Functional Weakness

Functional weakness is where there is inconsistent or unrecognizable neurological disease. It is a term used when the weakness does not fit a pattern of any neurological disease.

Hoover’s Sign

Hoover’s sign which is seen positive here is the most useful test to detect functional weakness. It separates organic paresis from non-organic paresis of the leg.

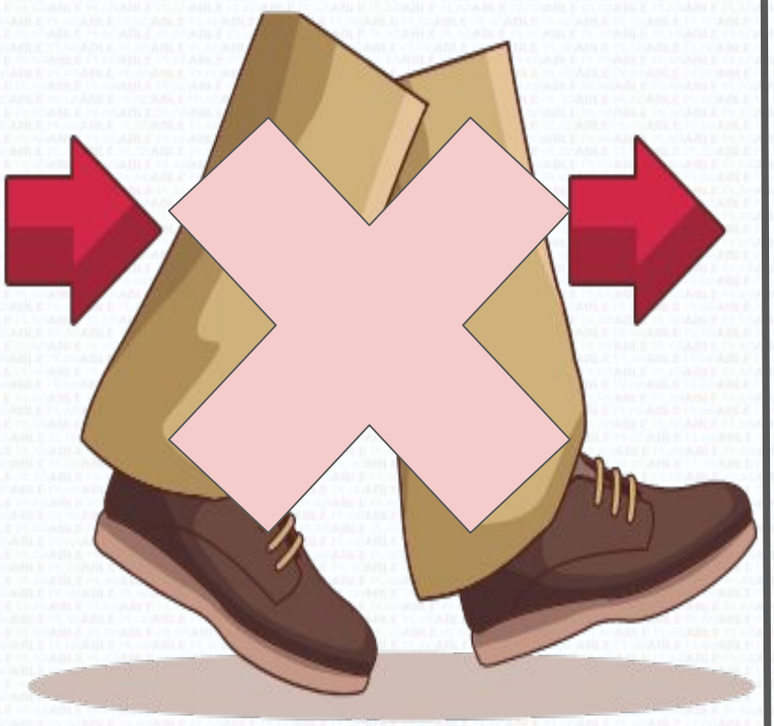
Principle → In a normal person, an involuntary extension of the hip occurs when flexing the contralateral hip against resistance.

In a patient with a non-organic cause **(e.g. functional weakness)**, you will NOT observe hip extension on the “normal” leg when the patient raises (flexes) the “paretic” leg because the effort is not being transmitted to either leg. Positive Hoover’s sign!

Video for Hoover’s sign
CLICK HERE

Akinesia Vs Tardive Dyskinesia

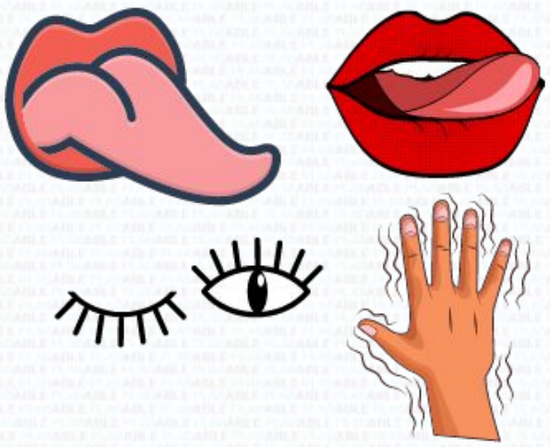
Akinesia



Loss of ability to move muscles voluntarily

Main cause → **Parkinson's disease**

Tardive dyskinesia



Repetitive involuntary movements like tongue protrusion, lip smacking, repeated blinking and twitching of hands

Main cause → **Chronic use of dopamine receptor blockers like neuroleptics** resulting in hypersensitivity of dopamine receptors

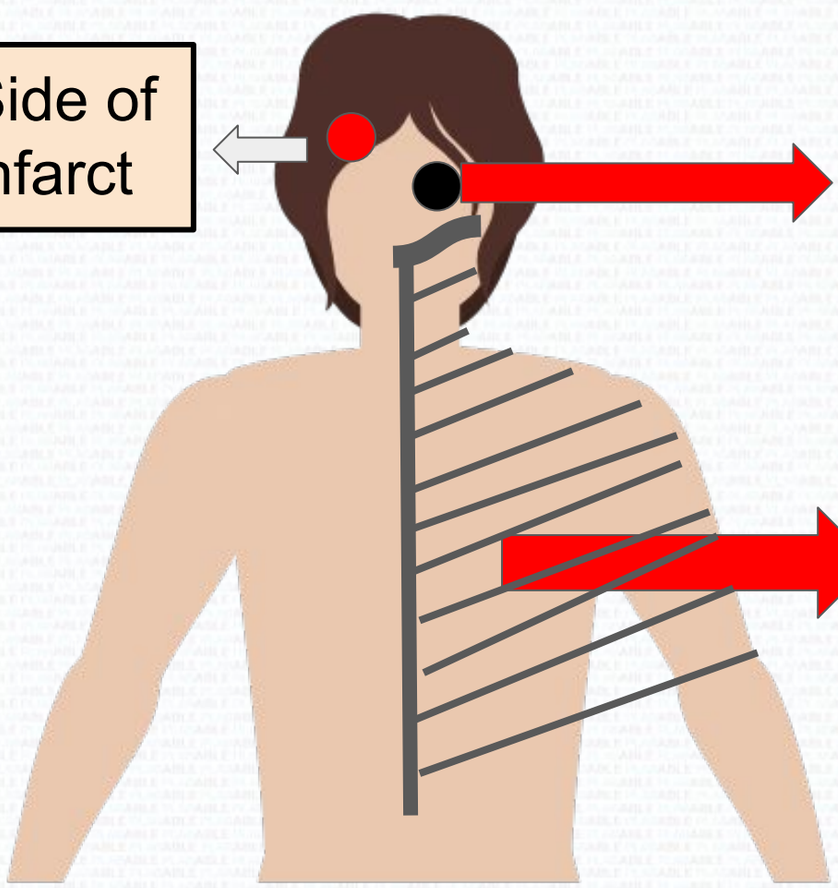
Click here for a video of other movement disorders

Middle Cerebral Artery Infarct

Remember the mnemonic "**CHANG**es" as MCA infarct is commonly tested

- **C**ontralateral hemiparesis and sensory loss in upper limbs and lower face
- **H**omonymous hemianopia without macular sparing (contralateral)
- **A**phasia
- **N**eglect (unawareness or unresponsiveness)
- **G**aze preference towards the side of the lesion

Side of infarct

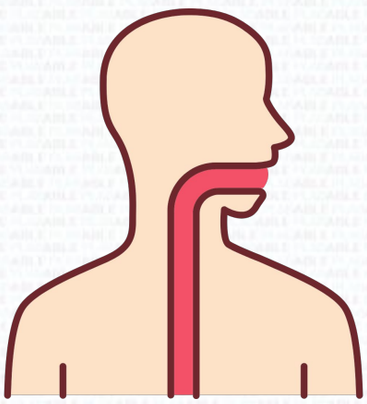


Homonymous hemianopia without macular sparing (contralateral)

Contralateral hemiparesis and sensory loss in upper limbs and lower face

Stroke and Dysphagia

There will be some patients who suffer a stroke who would not be able to swallow.



The usual process is to insert a nasogastric tube for enteral feeding if patient consents. This is done within days of having a stroke to avoid malnutrition.

Speech and Language Therapy (SALT) team will review the patient and continue to assess his ability to swallow.

If he starts to show signs that he can swallow again, then the NG tube can be removed

If after 4 weeks, still no signs that he can swallow, then a PEG should be considered

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